



# East Jordan

## Green Stormwater Infrastructure

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### VISIONING REPORT

SUBMITTED TO

The City of East Jordan  
East Jordan, MI 49727

December 23, 2020



**DRUMMOND  
CARPENTER**  
engineering + research



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## Project Introduction

This report summarizes the conceptual green stormwater infrastructure (GSI) visioning, community engagement, and modeling portions of the **Lake Charlevoix Communities: Increasing Capacity for Coastal Resilience** project. This project was grant funded, with funding provided by the Charlevoix County Community Foundation, and the Coastal Management Program, Water Resources Division, Michigan Department of Environment, Great Lakes, and Energy and the National Oceanic and Atmospheric Administration. The project is a collaboration between the Tip of the Mitt Watershed Council (TOMWC), Drummond Carpenter, and three municipalities within the Lake Charlevoix watershed. This project examined existing stormwater infrastructure in each of the three cities and highlighted opportunities to adopt new GSI practices. The project team selected areas for GSI consideration based on stormwater outlets to Lake Charlevoix, conditions of existing infrastructure, future planned improvements, and meetings with city officials. Locations of recommended GSI practices were then photographed and artistically rendered to show what a GSI practice could look like in that location. These graphics were used to help the public visualize different treatment options in context. They are not a guide to plant selection or the only configuration of a practice. Virtual public engagement during the project provided GSI educational material to the public and then surveyed the public regarding the rendered GSI concepts. The public surveys provide feedback regarding which applications each community favored as well as other comments and concerns.

## Timeline

Charlevoix, Boyne City, and East Jordan all participated in initial site selection, virtual interim meetings, and a public visioning processes that followed a similar timeline (Figure 1). Drummond Carpenter and TOMWC representatives participated in three meetings per community partner to refine the conceptual plans and make sure the vision met municipal goals. All meetings after March 2020 were transitioned from in-person meetings to virtual meetings, including the public engagement process.

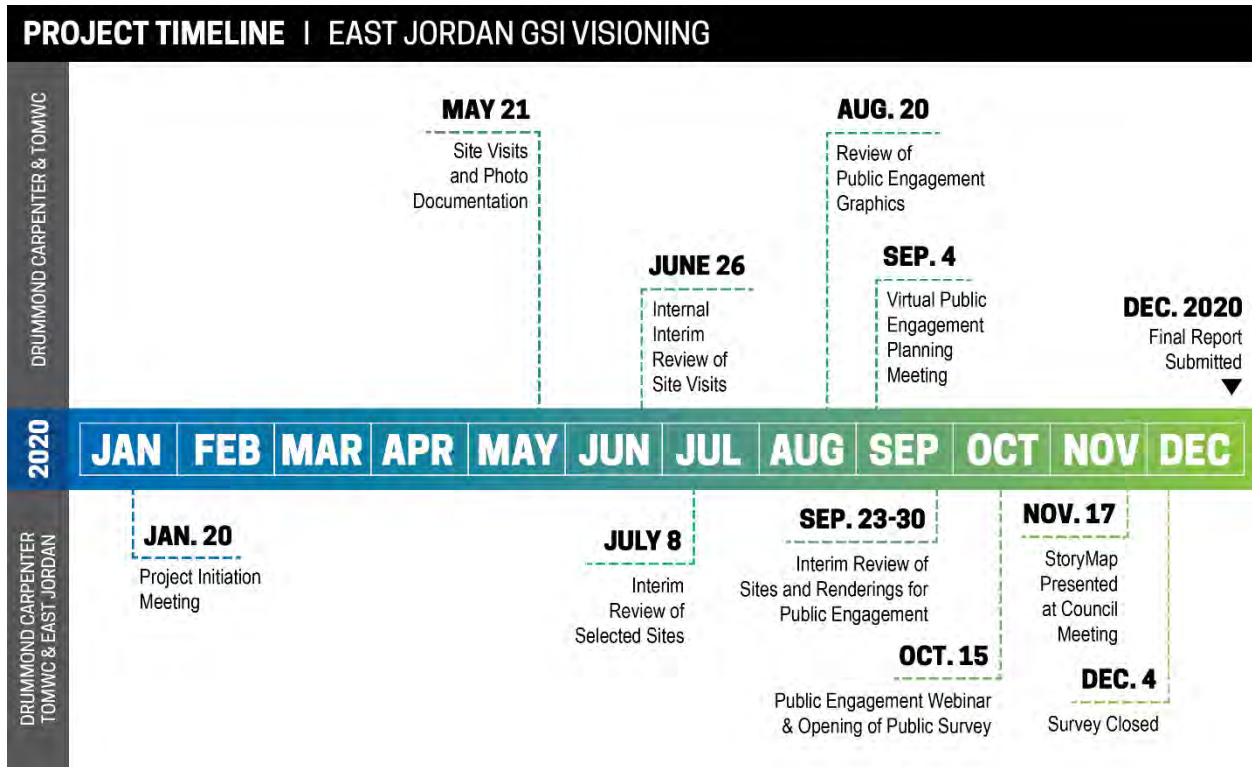


Figure 1 – Project Timeline

## Green Stormwater Infrastructure

Green Stormwater Infrastructure (GSI) manages stormwater by mimicking natural processes such as infiltration and evapotranspiration and can help keep water resources clean and protect public health. These practices can prolong the life of existing stormwater infrastructure and enhance stormwater treatment prior to release into Lake Charlevoix.

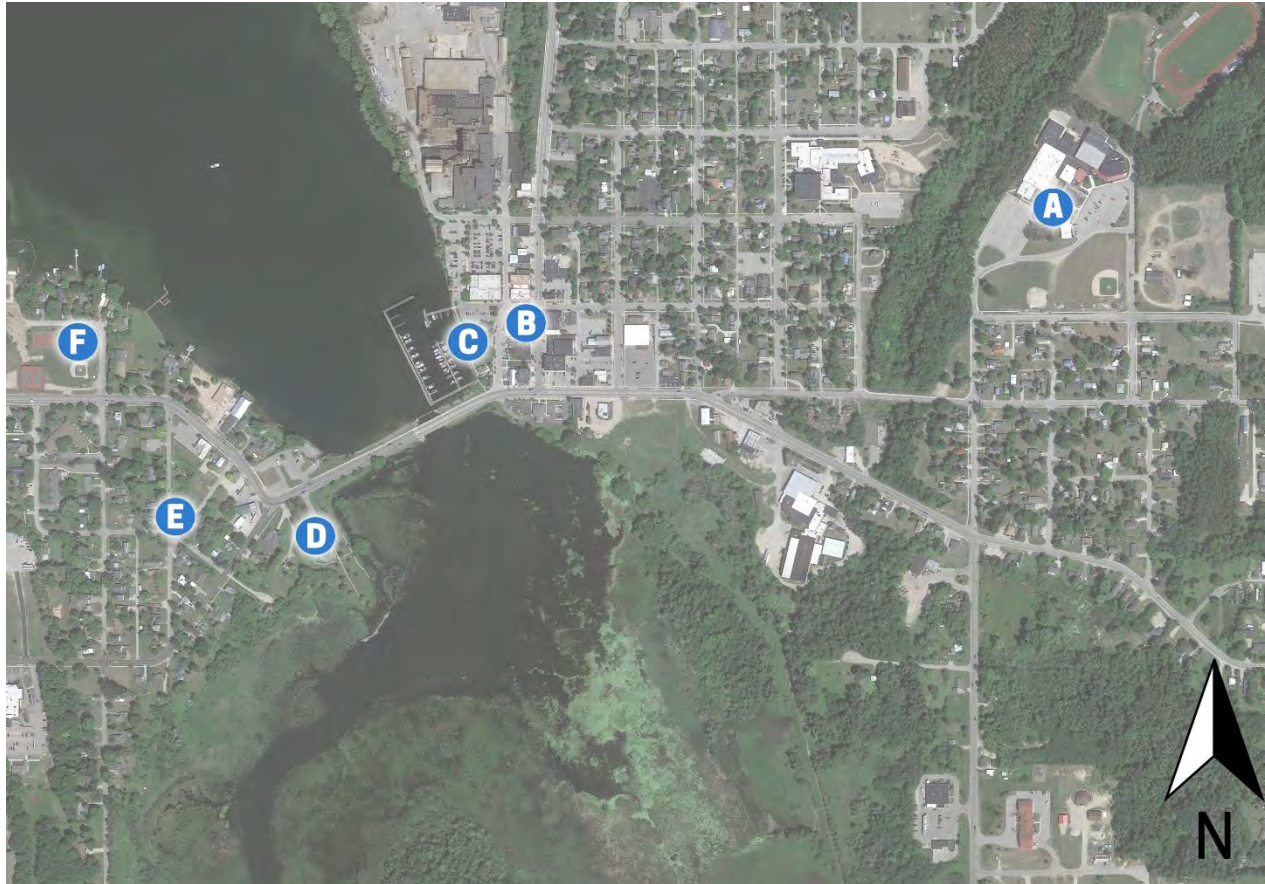
GSI offers several advantages over traditional, engineered stormwater drainage approaches, including:

- **Addresses stormwater at its source** - GSI practices seek to manage rainfall where it falls, reducing or eliminating the need for detention ponds and flood controls.
- **Promotes groundwater recharge** - Many GSI techniques allow stormwater to infiltrate the earth, recharging groundwater aquifers.
- **Allows for more flexible site layouts** - Designs can incorporate stormwater management in a variety of open spaces and smaller landscaped areas.
- **Preserves streams and watersheds** - GSI practices reduce both pollutant loads and streambank erosion associated with peak flows because of greater infiltration.
- **Enhances aesthetics and public access/use** - Well-designed vegetated practices, such as rain gardens, should be visually appealing as well as functional.
- **Reduces costs** - GSI reduces the need for pipes, asphalt, detention basins, or other infrastructure traditionally needed to handle runoff. It can also reduce energy costs and increase potential developable land area.

Common GSI practices with definitions and photographic examples are in Appendix A.

## Existing Conditions Assessment

Potential sites shown in Figure 2 were discussed at the Project Initiation meeting with East Jordan. These sites were visited on May 21 to evaluate potential for GSI practices and to photo document site conditions (see Appendix B for site visit notes). Sites were evaluated based on field observations of existing drainage patterns, existing infrastructure, signs of ponded water, and planned use. Water quality monitoring data from Lake Charlevoix stormwater outfalls was used to further inform focus areas within the community. Finally, East Jordan provided infrastructure and planning documents related to these sites.



**Figure 2 – Evaluated Site Locations**

The files provided by East Jordan used for evaluating potential GSI sites included:

- **City of East Jordan Master Plan** (2015 Master Plan.pdf) – *November 2015*
- **East Jordan DDA 2017 Annual Report** (2017-East-Jordan-DDA-Annual-Report.pdf) – *March 2018*
- **City of East Jordan Sub-Area Waterfront Master Plan Draft Recommendations** (Charrette-connecting-town.pdf) – *January 2018*
- **Chain of Lakes Downtown Enhancement Study** (Dda\_44\_1890271022.pdf) – *April 2004*
- **City of East Jordan Parks and Recreation Master Plan** (East-Jordan-Rec-Plan-2018.pdf)
- **First Impressions Tourism Summary Report East Jordan, Michigan** (FIT2018-East-Jordan-Final-Report-1.pdf) – *August 2018*

## GSI Visioning

Feasibility of each proposed GSI location and practice type was evaluated using available information. Potential locations of GSI practices were discussed with city officials to determine which GSI retrofit opportunities should progress to further visioning and public surveys (Appendix B). A representative number of practices were artistically rendered to help the public visualize different treatment options in context of each site. Plants depicted in the renderings are listed in the *Lake Charlevoix Watershed Homeowner's Guide*<sup>1</sup>; however the renderings only show example plant pallets. It should be noted that not every viable or desired GSI practice was included in the visioning process and that other locations described in Appendix B are well suited for GSI implementation.

## Public Engagement

An ESRI StoryMap, a website based immersive story platform, was created for the overall project<sup>2</sup> and each of the three communities involved. The overall project StoryMap was setup with background information on the project, links to the individual community StoryMaps, video recording of the public engagement webinar, Lake Charlevoix watershed background, and information on stormwater pollution and green stormwater infrastructure. StoryMaps for each community contained details for each site including maps, existing and artistically rendered images, and a brief description.

From October 15 to December 4, 2020, a public survey was hosted on the StoryMap for each community to gather input on public perception of GSI techniques and locations. Questions gauged the respondent's reaction to GSI practice locations, aesthetics, and overall concept as well as prioritization of practices. Appendix C contains a list of the questions, results, and all comments received through the survey. Seventy-four (74) participants submitted surveys for East Jordan. Majority of the public participation came immediately following a Facebook post by the City of East Jordan.

## Stormwater Modeling & Cost Estimating

Stormwater modeling and a general cost estimate was performed for each of the rendered GSI practices. These analyses provide estimates of potential stormwater reductions each practice could achieve based on its contributing drainage area and size. The runoff reduction modeling and conceptual cost estimates are provided as a tool for stakeholders and municipal leadership to prioritize implementation.

### Runoff Volume Calculations (Existing and Proposed)

Runoff volumes were calculated using the SCS Curve Number Method<sup>3</sup> for existing and proposed conditions. A 2-year 24-hour storm (approximately 2.18 inches of rainfall<sup>4</sup>) was used for the calculations. The 2-year 24-hour storm was selected because it is a common design storm used for green infrastructure design and represents about 99% of all rainfall events. Calculations were performed in an excel spreadsheet, *EJ\_Runoff Calculations\_CN.xlsx*. The *EJ\_Runoff Calculations\_CN.xlsx* spreadsheet

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<sup>1</sup> *Lake Charlevoix Watershed Homeowner's Guide* (Oct. 2016) pages 12-13 - Tip of the Mitt Watershed Council

<sup>2</sup> Lake Charlevoix GSI Visioning – ArcGIS StoryMaps (Dec 2020 Web Link: [arcg.is/OiWbz5](https://arcg.is/OiWbz5))

<sup>3</sup> USDA SCS (Soil Conservation Service). (1986). "Urban Hydrology for Small Watersheds." SCS Technical Release No. 55. Washington, DC.

<sup>4</sup> NOAA (National Oceanic and Atmospheric Administration). (2013). "Precipitation-Frequency Atlas of the United States." Volume 8 Version 2.0. Silver Spring, MD.

could be manipulated for larger storm events by changing the precipitation value, but this should be done with caution since many design choices (such as bioretention size and curve number values) were based specifically on a 2-year 24-hour storm. Further detail and SCS curve number calculation details are included within the *EJ\_Runoff Calculations\_CN.xlsx* spreadsheet.

Calculation Process:

- **Drainage Areas**  
Each site is broken into sub-drainage areas determined by common outlet points. The areas were determined through data provided by the municipalities, site visits, and google earth elevations. A GIS site plan of existing conditions was created in AutoCAD and used to determine the areas for calculations.
- **Cover Type**  
Cover type was determined from site visits and Google Earth aerial images<sup>5</sup>.
- **Soil Type**  
Soil type was determined from USDA Web Soil Survey<sup>6</sup> for each sub-area. Each area’s soil type is listed at the top of the *EJ\_Runoff Calculations\_CN.xlsx* spreadsheet.
- **CN Values**  
The CN values were selected after determining the cover type and soil type. All CN values, excluding green infrastructure, are taken from SCS Method. CN values used in runoff calculations are listed in *Table 1 – CN Values*. Green infrastructure is assigned a CN Value of 100 because all water that lands on that area is accounted for in retention and subtracted at the end.

**Table 1 – CN Values**

<b>Cover Type</b>	<b>CN Value</b>
Impervious Surfaces	98
Soil – HSG D – Lawn	80
Green Infrastructure	100

Since each sub-area has multiple cover types, a composite CN value was determined for the sub-area:

$$CN = \frac{\sum(A_i * CN_i)}{A}$$

A<sub>i</sub>=Surface Area of cover type (acres)

A=Surface Area Total (acres)

CN<sub>i</sub>=Curve Number for Cover Type

CN=Composite Curve Number

<sup>5</sup> Google Earth 2020

<sup>6</sup> NRCS (Natural Resources Conservation Service). (2017). "Hydrologic Soils Map." Web Soil Survey, <<http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>> (23 JUN. 2017).



- Volume of Runoff

Total areas and composite CN values for each sub-area were used to calculate the runoff with the SCS Method. The equation details are in *EJ\_Runoff Calculations\_CN.xlsx* spreadsheet. The SCS Method generates runoff values which were multiplied by the sub-area's total area to obtain runoff volumes.

- Runoff Reductions

Separate tabs are setup within the *EJ\_Runoff Calculations\_CN.xlsx* spreadsheet for existing and proposed (*New*) conditions. The differences between the New tab and Existing tab are that cover types are changed for the green infrastructure and storage volumes added. Storage volumes for green infrastructure are quantified in *EJ\_Runoff Calculations\_CN.xlsx* and listed in the Storage column. Areas that are retained for a 2-year 24-hour storm, like rain barrels or bioretention areas, are accounted for as reductions after the runoff from that drainage area is calculated (see *EJ\_Runoff Calculations\_CN.xlsx* spreadsheet). The *New* tab also has a summary of before and after runoff amounts and the reductions in each sub-area.

### Reduction Percentages for Individual BMPs

Reductions and sizing for each green infrastructure treatment are calculated in the *EJ\_ReductionPercentages.xlsx* spreadsheet. Calculations use the runoff values for each drainage area that were calculated in the *EJ\_RunoffCalculations.xlsx* spreadsheet. The spreadsheet is divided into a tab for each GSI treatment type. If adequate space was available, the GSI practice was sized for a 2-year 24-hour storm. In some cases, a larger storm volume could be contained (i.e. more than 100% capture of a 2-year 24-hour storm) but capture percentage was set at 100%.

### Conceptual Cost Estimate

A conceptual cost estimate was determined based on GSI projects in Michigan. Estimates for this project are based on an average cost per square foot of treatment surface of the envisioned design. For some practice types, like bioretention and permeable pavers, the practice type can have a wide range of costs dependent on infrastructure and aesthetic requirements. For these practice types high and low complexity costs are listed. Each practice was assigned either a low or high complexity cost based on the location and anticipated difficulty of installation and design. Surveyed drainage areas, design complexity, and further site details will influence the engineered design and result in lower or higher project costs.

## Appendix A – Green Stormwater Infrastructure Practices

# RAIN GARDEN / BIORETENTION

A Rain Garden or Bioretention Cell is a shallow depression area in the landscape that captures and treats stormwater runoff in an amended planting soil mix. The depression (or ponding area) allows water to pool for a short time (less than 24 hours) after a rainfall and then slowly absorb into the soil and vegetation.



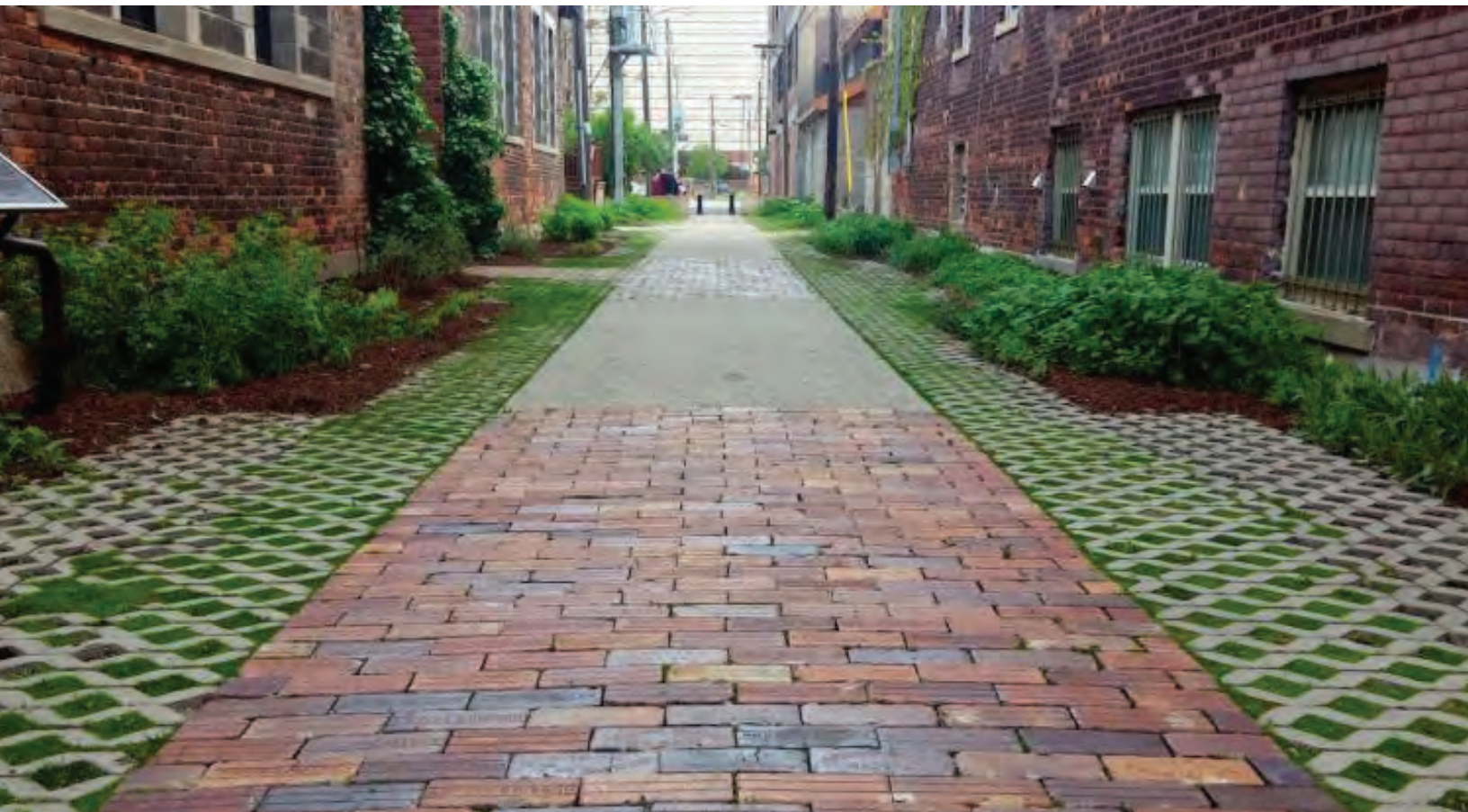
Native plants are typically used because of their deep roots, hardiness, and ability to provide habitat for native species.



# GREEN ALLEYS

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**Green Alleys** and low traffic roads incorporate permeable pavers and underground stormwater storage to help intercept, filter and infiltrate stormwater before it drains into stormwater catch basins. Pedestrian alleys can also feature stormwater planter boxes, which are similar to raised bioretention beds.



# POROUS PAVEMENT



**Porous Pavement** is a stormwater management technique that combines storage and infiltration with a structural pavement.

Porous pavement can consist of permeable asphalt, porous concrete or interconnected concrete paver blocks that are underlain by a storage reservoir.



# NATIVE LANDSCAPING

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**Native Landscaping** uses native plants instead of turf grass or other higher maintenance non-native landscaping features.

Native landscaping performs similar to a rain garden but without the ponding and enhanced underground storage areas.



# BIOSWALE

A **Bioswale** (or bioretention swale) is a naturalized swale that has the additional component of bioretention planting mix and/or a stone sub-basin to promote additional storage and infiltration.

Bioswales reduce runoff volume and increase water quality, while also providing conveyance of excess runoff. The use of pretreatment control measures such as filter strips or other sediment capturing devices can reduce sediment accumulation in the swale.

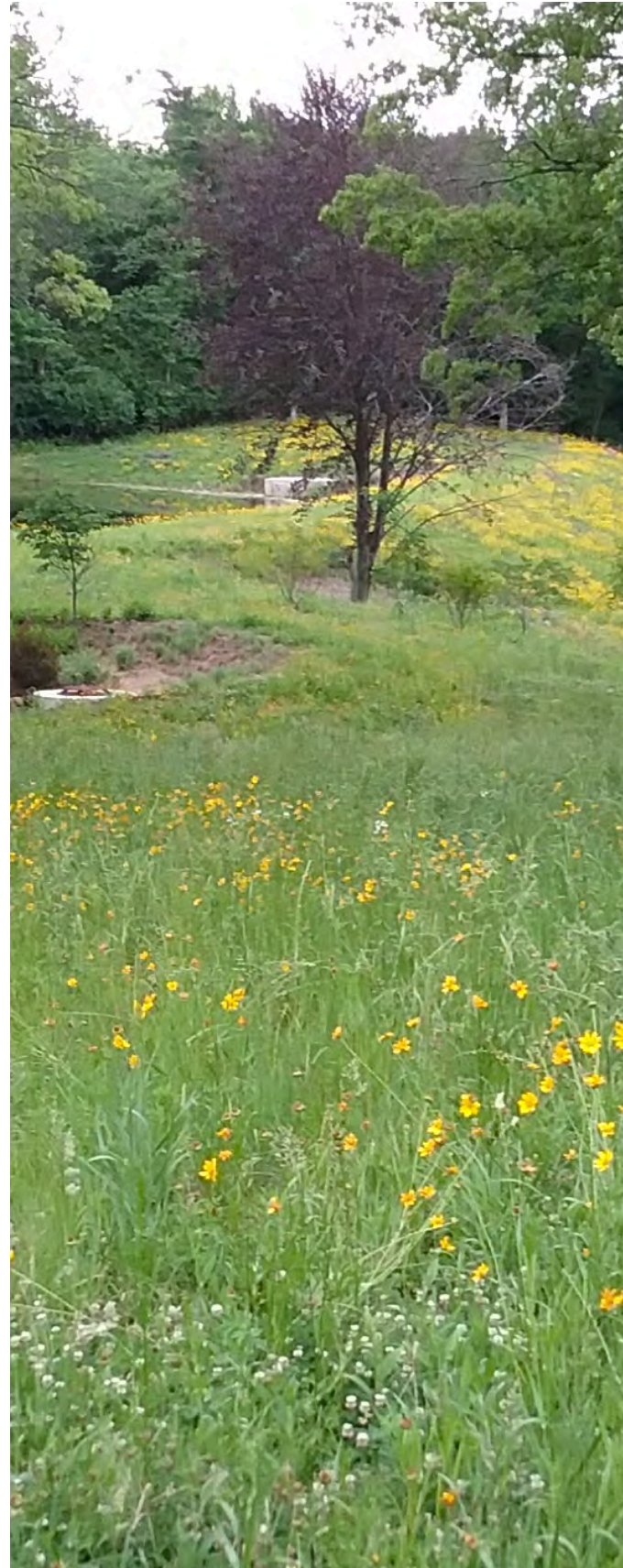


# NATIVE PRAIRIE

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A **Native Prairie** is a large scale naturalized grassland area that utilizes deep fertile soil, a cover of tall coarse grasses, flowers and other native prairie plants to absorb stormwater runoff from the surrounding areas.

Native prairie also provides habitat for native species.





# NATIVE SHORELINES

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**Native Shorelines**, also known as a riparian buffer, consist of a mix of native trees, shrubs, and herbaceous plants along a lake or river shoreline. Riparian buffers provide many benefits to the lake ecosystem, including shoreline stabilization and erosion control, habitat for shoreline-dependent species, infiltration of runoff, and filtration of pollutants such as sediments, nutrients, and chemicals.

Native shorelines can be divided into different zones that include varying vegetation to enhance the quality of the body of water they are adjacent to. It is important to note turf grass does not provide the same benefits that a mix of native vegetation does and is not considered an adequate buffer.



# TREE BOX FILTERS

**Tree Box Filters** Tree box filters help to effectively manage stormwater by providing areas where water can collect, undergo filtration, and either naturally seep into the ground, be absorbed by the tree, or be transferred to storm drains. They are typically pre-cast or cast-in-place concrete structures that can be set adjacent to structural pavements. The boxes are then filled with loose, filtering soils, which allow urban trees to thrive by providing space for an extensive root system.



# STREET TREES

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**Street Trees** play a significant role in the urban hydrologic cycle through tree canopy interception of precipitation, promoting increased infiltration along root paths, removal of water from the soil by roots, and release of water back into the atmosphere through evaporation and transpiration.

Mature street trees are an extremely valuable resource when it comes to stormwater management and should be designated to remain on site and protected during all construction activities whenever possible.



# STORMWATER TREATMENT WETLANDS

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**Stormwater Treatment Wetlands** are engineered, shallow-water ecosystems designed to treat stormwater runoff. Commonly implemented in low-lying areas, stormwater wetlands are well suited to areas along river corridors where water tables are already higher.

Stormwater treatment wetlands provide flood and nutrient control benefits by storing nutrients and slowly releasing water over several days. They also provide excellent plant and wildlife habitat and can be designed as public amenities with trails or platforms for wildlife viewing.



# NATURALIZED SWALE



A **Naturalized Swale** is a stormwater drainage swale or “ditch” that incorporates native landscaping instead of mowed turf grass.

The swale can be vegetated with a combination of grasses, shrubs, and/or trees designed to slow, filter, and possibly store or infiltrate stormwater runoff.



# CISTERN

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**Cisterns** are structures designed to intercept and store stormwater runoff from rooftops.

Stormwater is typically reused for irrigation or other water needs thereby reducing potable water consumption.



# VEGETATED ROOF



**Vegetated roofs**, or green roofs, are conventional rooftops that include a thin covering of vegetation allowing the roof to function more like a vegetated surface that provides both filtration and infiltration of runoff, but also provides other co-benefits including increased biodiversity and environmental cooling.

The overall thickness of the vegetated roof may range from 2 to 6 inches, typically containing multiple layers consisting of waterproofing, synthetic insulation, non-soil engineered growth media, fabrics, synthetic components, and foliage.



## Appendix B – Meeting Minutes (Project Initiation and Site Visits)

Project Initiation Meeting – January 20, 2020



## Drummond Carpenter, PLLC

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27 January 2020

### General Meeting Agenda for Tip of the Mitt Watershed Council GSI Visioning 2020 Project

#### Meeting:

Monday, January 20, 2020

12 pm to 1:30 pm – East Jordan

**Attendees:** Jennifer Buchanan (Tip of the Mitt), Ashley Soltysiak (Tip of the Mitt), Don Carpenter (Drummond Carpenter), Rachel Pieschek (Drummond Carpenter), Tom Cannon (City of East Jordan)

#### Meeting Minutes:

- Overview of Green Stormwater Infrastructure (GSI) visioning process
  - Drummond Carpenter’s past visioning projects with the Clinton River Watershed Council
  - WaterTowns program and Elk Rapids (example work products provided separately).
  - Deliverables & Timeline
    - Community engagement meeting
      - Target timeframe will be sometime in the last two weeks of August
      - Estimate of 40-50 people (the number that came to master planning sessions)
      - Location – Downtown Community Center in larger meeting room
    - Site visits in May or June (when snow is cleared)
- There is no comprehensive documentation of storm sewer system in East Jordan. Anything post 1998 was documented. Some of the undocumented portions may have connections to sanitary sewer and do not outfall directly to Lake Charlevoix.
- Discussion of potential locations for GSI visioning – numbers are labeled on pdf map
  - (1) East Jordan Schools
    - School parking lots drain to Brown Creek
    - At least some of school roof is directly connected to storm sewer
    - Adjacent junkyard is in process of being cleaned up and is now owned by school
  - (2) DDA
    - DDA is getting ready to work on downtown aesthetic improvements. Currently have planter boxes that are irrigated. There are some overgrown and older trees that might be removed/replaced soon.
  - (3) Memorial Park
    - Existing parking to remain
    - Plaza planned for on the corner and pedestrian bridge across the river to previous boat launch location which will be replaced with greenspace
  - (4) Tourist Park and boat launch
    - Elevation is very close to lake level – there is topography documentation available for the park
    - There is an upstream laundry facility with contamination issues that affect the park. Park has groundwater monitoring wells and vacant site on corner has had sheet piling efforts to stop contamination flow.
  - (5) Sportsman’s Club Park

Meeting Minutes – Lake Charlevoix GSI Visioning 2020 – East Jordan  
27 January 2020

- Standing water issues and backwater issues from drains due to high water levels
- Park is impacted by high lake levels
- (6) John, Jordan Street, and Bridge street
  - This is the oldest part of town with streets in bad shape and old storm sewer network
- (7) Echo and Dickens - access to boat launch
  - Streets in this area could use improvements to stormwater infrastructure

Data Requests:

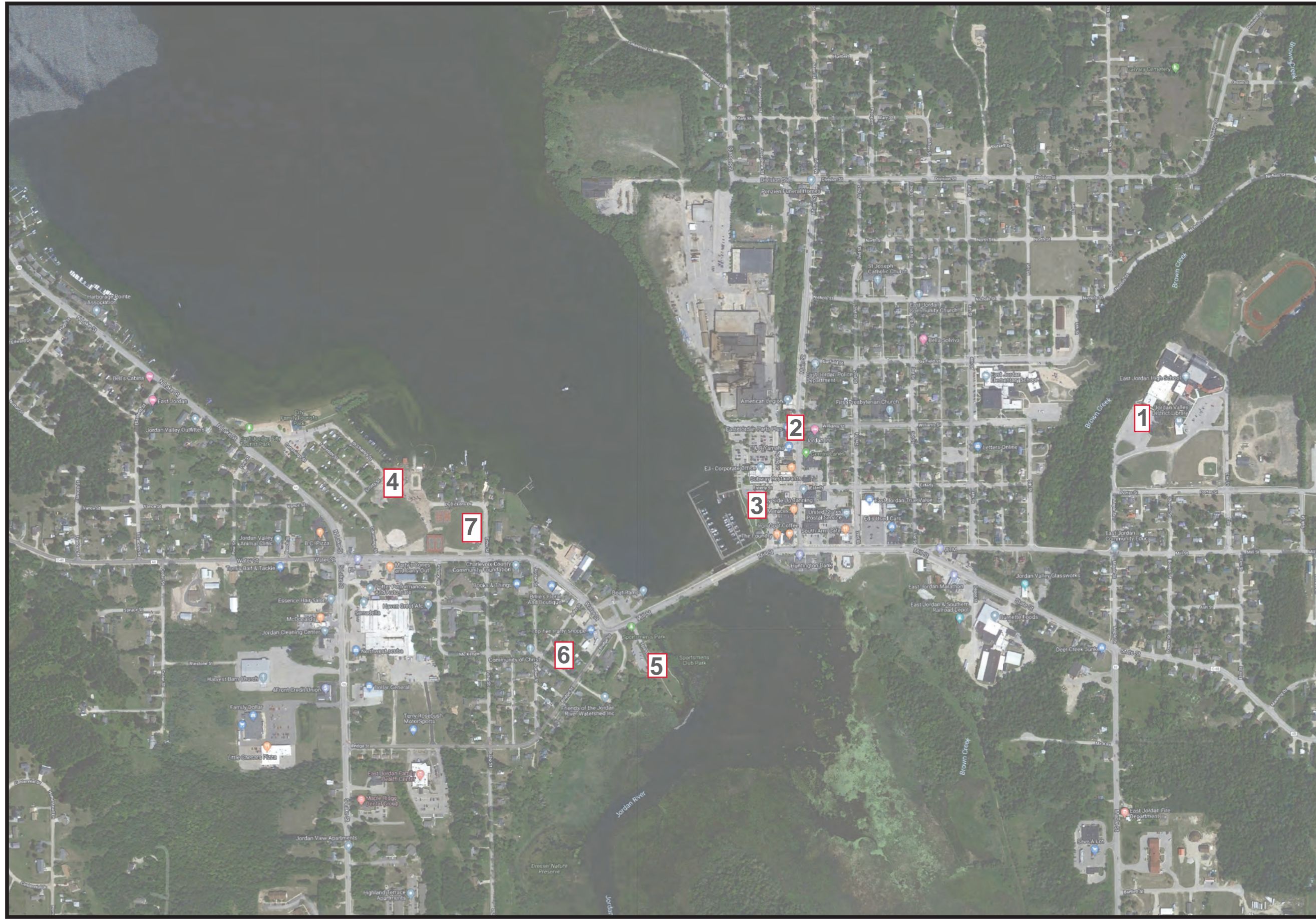
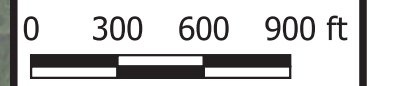
- C2AE contact for city stormwater documents
  - Stormwater infrastructure (storm sewers, inlets, catch basins, manholes, etc)
  - Site plans or topography information for the sites listed in the attached pdf (if available)

Tip of the Mitt  
Watershed Council

GSI Visioning 2020  
East Jordan

Legend:

Notes:

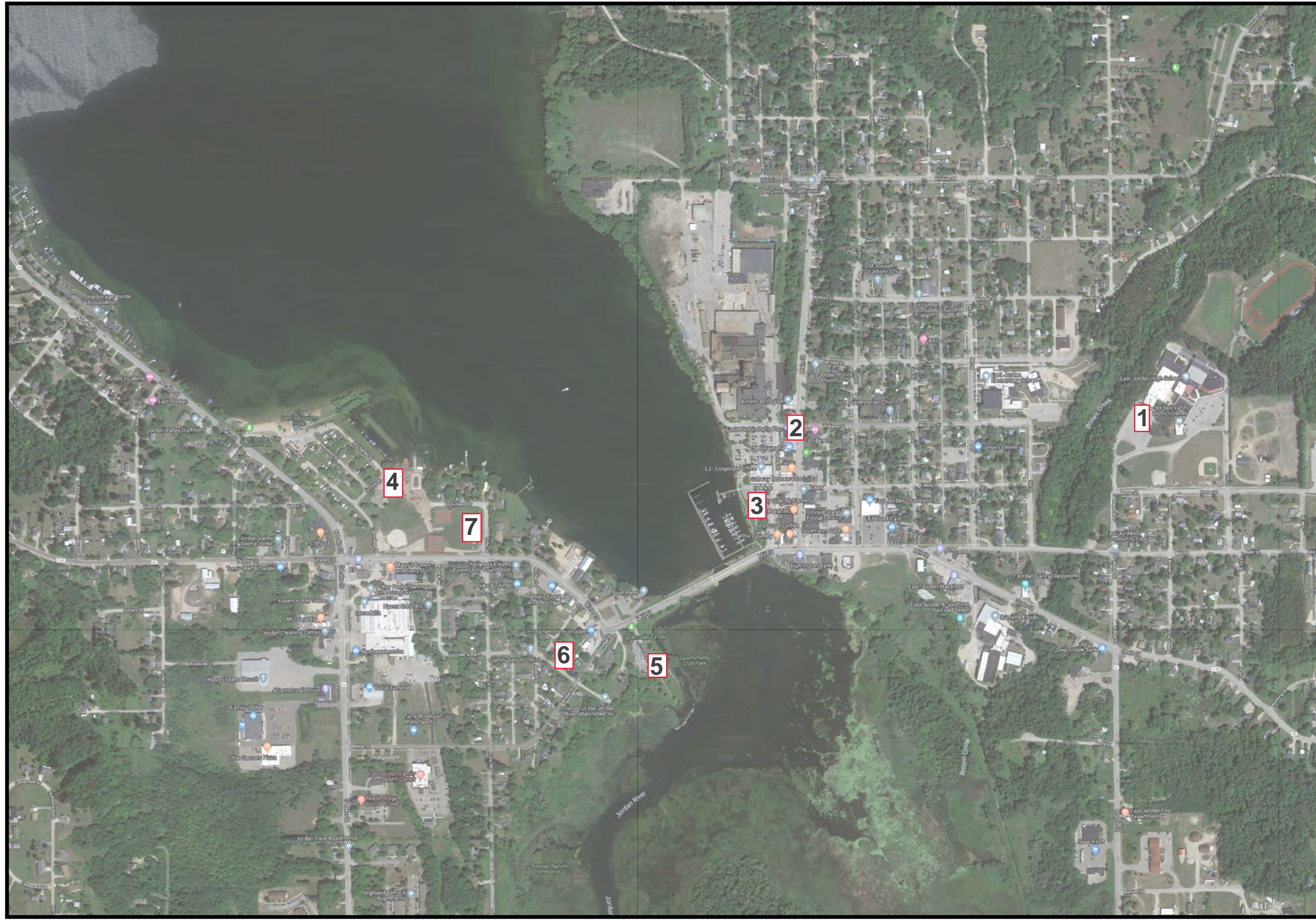
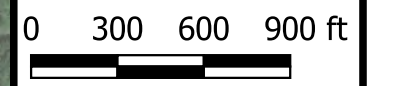


Tip of the Mitt  
Watershed Council

GSI Visioning 2020  
East Jordan

Legend:

Notes:



# Appendix B – Meeting Minutes (Project Initiation and Site Visits)

Site Visit Notes

## East Jordan Site Visit Notes

On 21 May 2020, Don Carpenter and Rachel Pieschek conducted a field visit of the sites discussed in the 20 January 2020 Lake Charlevoix GSI Visioning Project meeting. This document is a status update on the visioning process and contains questions (**Bolded in Blue**) for the municipality that are answered at the interim meeting in the next section. It is based on the site visit and interim meetings with TOMWC.

### Site Notes:

1. East Jordan Schools
  - a. **Are the schools aware of our green infrastructure visioning? Can we get documentation of the building and storm sewer drainage for the school?**
  - b. School parking lots drain to Brown Creek. The west parking lot has no catch basins and rainfall runoff sheetflows to the SE corner where there are two curb cuts.
    - i. North curb cut - Some silt buildup and slight erosion visible.
    - ii. South curb cut - Appears unaffected by the runoff and in good condition.
    - iii. Green space/parking island could be lowered to encourage water infiltration before the curb cut. This could be slightly depressed and mowed or planted with native plants.
    - iv. Swale on east side of this parking lot could be enhanced by widening the swale and using native plants to provide more treatment near the culvert.
  - c. South-West side of building near large parking lot
    - i. Some outlets from the building roof show erosion next to the building. The stormwater is still being treated by infiltrating on the lawn, but bioretention practices could improve aesthetics and reduce erosion and stormwater flows onto adjacent sidewalks.
  - d. East parking lot has two catch basins that connect to storm sewer and likely are piped to Brown Creek.
    - i. Underground infiltration chambers are recommended here. It is not a visible practice but would be highly effective in sandy soils and not impede traffic at the building entrance. This would reduce stormwater flows and erosion at the outlet pipe while improving Brown Creek's water quality.
    - ii. There are areas of sheet flow coming off the angled school rooftops. There were no signs that this is causing issues with temporary ponding of water next to the buildings and on sidewalks but adding bioretention (rain gardens) in some areas near the building is recommended.
  - e. South Outlet to Brown Creek
    - i. The outlet has large rocks to slow outlet flows and is level with the stream. If these were rearranged to create more of a pretreatment basin, it would reduce the sediment going into the stream and provide some water quality pretreatment.
  - f. Catch Basins along the back of the building
    - i. Many of these catch basins are very close to the building and are in a newly constructed area. These are difficult to treat at the source without significant cost.
    - ii. Some treatment could be added at the outlet pipe. Naturalized pools or even stone basins could slow stormwater coming from the outlet pipe, reduce erosion, and infiltrate water to improve water quality in Brown's Creek. **How used is this corner of**

**the north parking lot behind the school? Treatment could be in the woods on the ravine or start in the corner of the parking lot.**


- iii. There is one more outlet pipe in the woods that could be treated similarly. It likely pipes runoff from the building roofs.
  - g. Adjacent junkyard is in process of being of redevelopment. Construction site was not entered or evaluated as part of the site visit.
2. Downtown
- a. The Village is getting ready to work on downtown aesthetic improvements. The downtown currently have planter boxes that are irrigated. **These planter boxes are very structured – Is there interest in removing them or just replanting?** As raised stone planter boxes, it would be very difficult to use them to treat stormwater.
  - b. Most of downtown has enough elevation above lake level to make infiltration practices potentially feasible. North and east of the downtown there are opportunities to capture runoff from the residential areas as well.
    - i. **Could any space in the park on the corner of Williams Street and Main street be used for stormwater treatment with bioretention/rain gardens? This location was not previously discussed.**
  - c. There are some overgrown and older trees in the downtown that might be removed/replaced soon. These could be replaced with stormwater tree boxes that capture runoff from the road to water the trees (similar to Northport Downtown).
  - d. There are a few catch basins in town that could be replaced with bioretention bump outs. This would convert a few parking spaces and treat stormwater before it goes into the catch basin. **How in demand are parking spots in the Downtown?**
  - e. Williams Street and Easterly Street have wide right of ways and could incorporate bioretention between parking and sidewalk.
3. Memorial Park
- a. Recommend leaving a larger natural buffer between the water and the mowed portion of the park. This helps filter runoff and reduce shoreline erosion.
  - b. This is a very manicured park. Reducing the amount of fertilizer and weed prevention would help improve water quality.
4. Boat Launch
- a. New boat launch has stormwater treatment – Looks good except the obvious impacts from high lake levels. No recommendations here. **Is there any documentation for the nearby outfall?**
5. Sportsman’s Club Park
- a. Park is impacted by high lake levels. There are opportunities to naturalize shoreline instead of fighting lake levels. Instead of piping stormwater from the parking lot to the river, curb cuts and creating a treatment wetland are possible in a few areas.
6. John Street, Jordan Street, and Bridge Street
- a. This is the oldest part of town and city officials mentioned in the 20 January 2020 meeting that these roads are near the end of life with an old storm sewer network. Bridge street looks recently redone, so we focused on John and Jordan.
  - b. The intersection of John, Jordan, and Union streets is large and has five roads coming together at once. Reducing the paved area and simplifying this intersection can be combined with stormwater treatment by making removed areas into bioretention.

- c. Currently there is no stormwater structures on these streets and there appears to be high water table in this area. A small strip of bioretention/swale along one side of the road may help reduce stormwater flow onto adjacent properties. If stormwater infrastructure is added, a swale as pretreatment before it enters the pipe is recommended. We can show a variety of green street options for this area, but the feasibility would depend on water table and resident desires for stormwater management.
- 7. Echo Street and Dickens Street - access to boat launch
  - a. There is ample space between the baseball diamond and street. This side of the street could be retrofitted with a swale along the road. The swale could be mowed or planted with native plants for additional water treatment before it enters the catch basin on the corner.



# EAST JORDAN 1 - EAST JORDAN SCHOOLS

## Legend

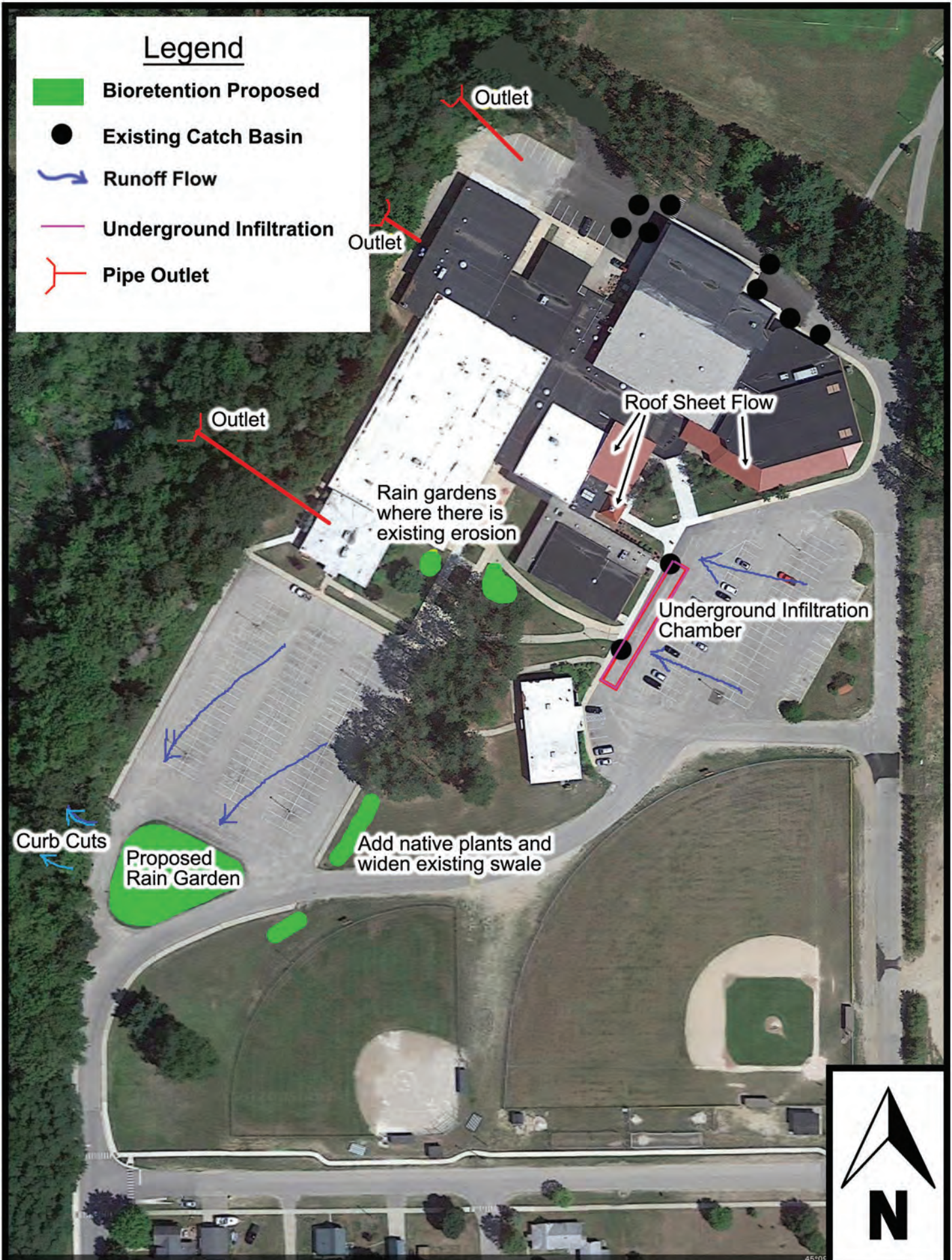
 Bioretention Proposed

 Existing Catch Basin

 Runoff Flow

 Underground Infiltration

 Pipe Outlet



Outlet

Outlet

Outlet

Roof Sheet Flow

Rain gardens where there is existing erosion

Underground Infiltration Chamber

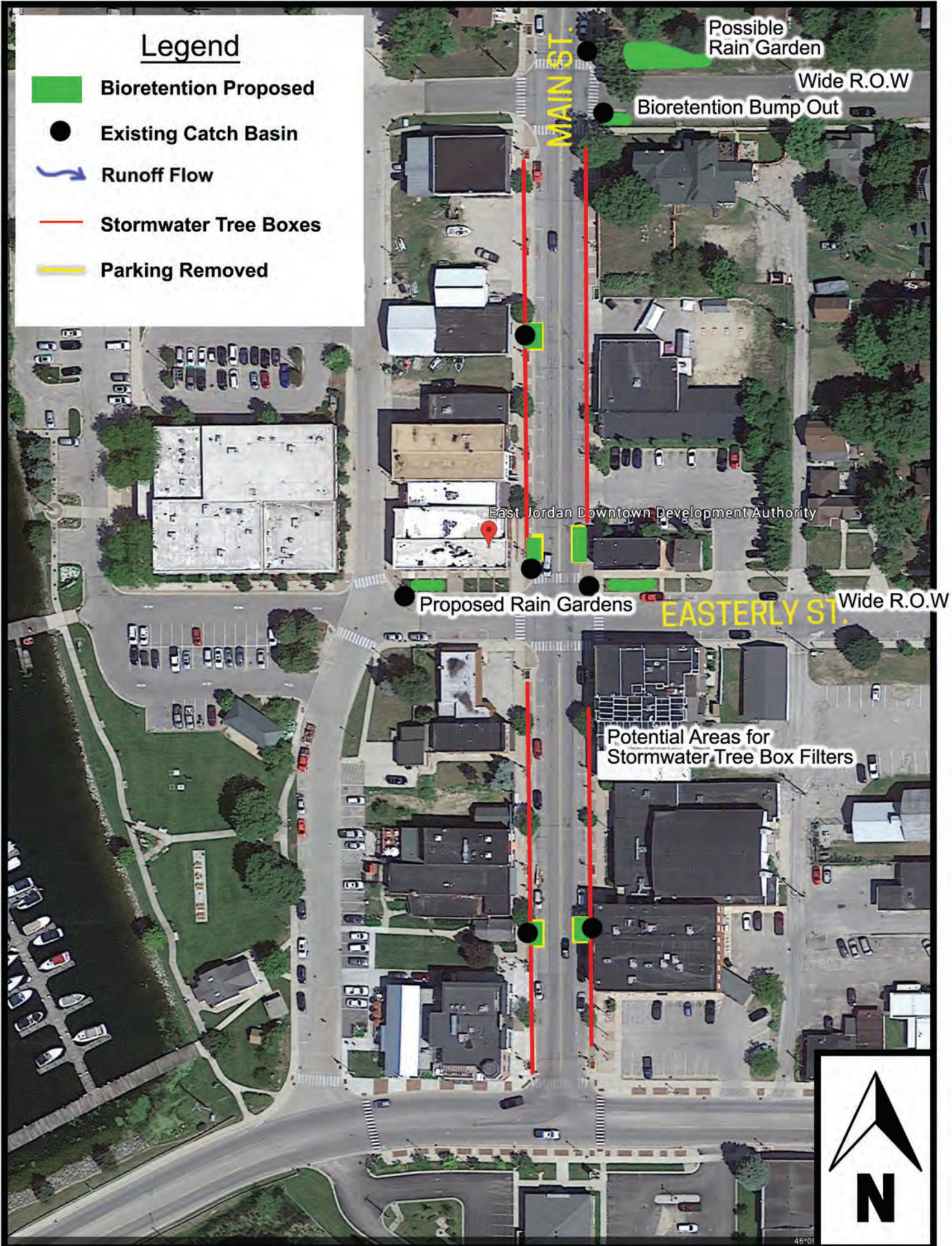
Curb Cuts

Proposed Rain Garden

Add native plants and widen existing swale



# EAST JORDAN 2 - DOWNTOWN



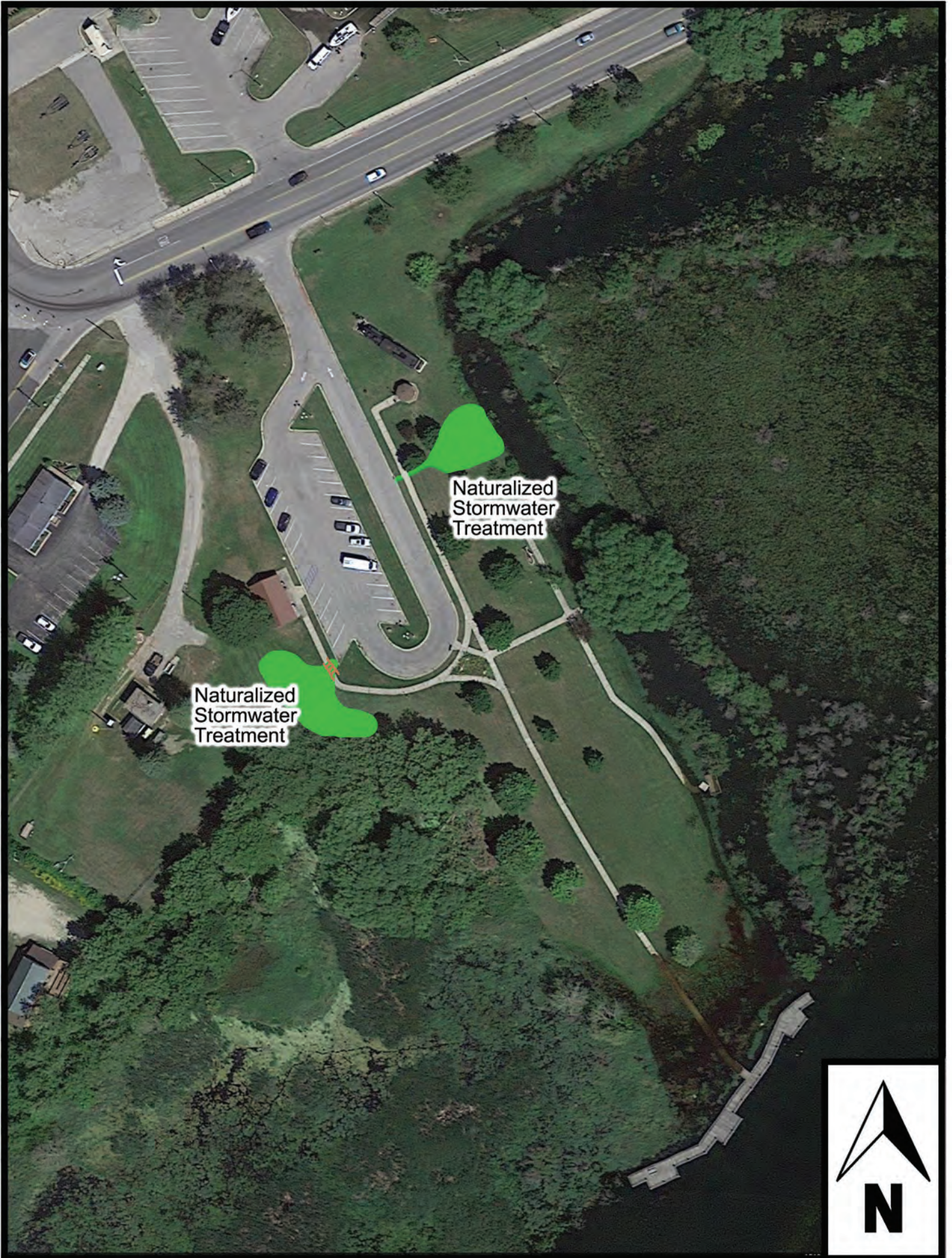
# EAST JORDAN 3 - MEMORIAL PAK



Naturalized Shoreline



# EAST JORDAN 5 - SPORTSMANS CLUB PARK



# EAST JORDAN 6 - JORDAN, JOHN & BRIDGE STREET

## Legend

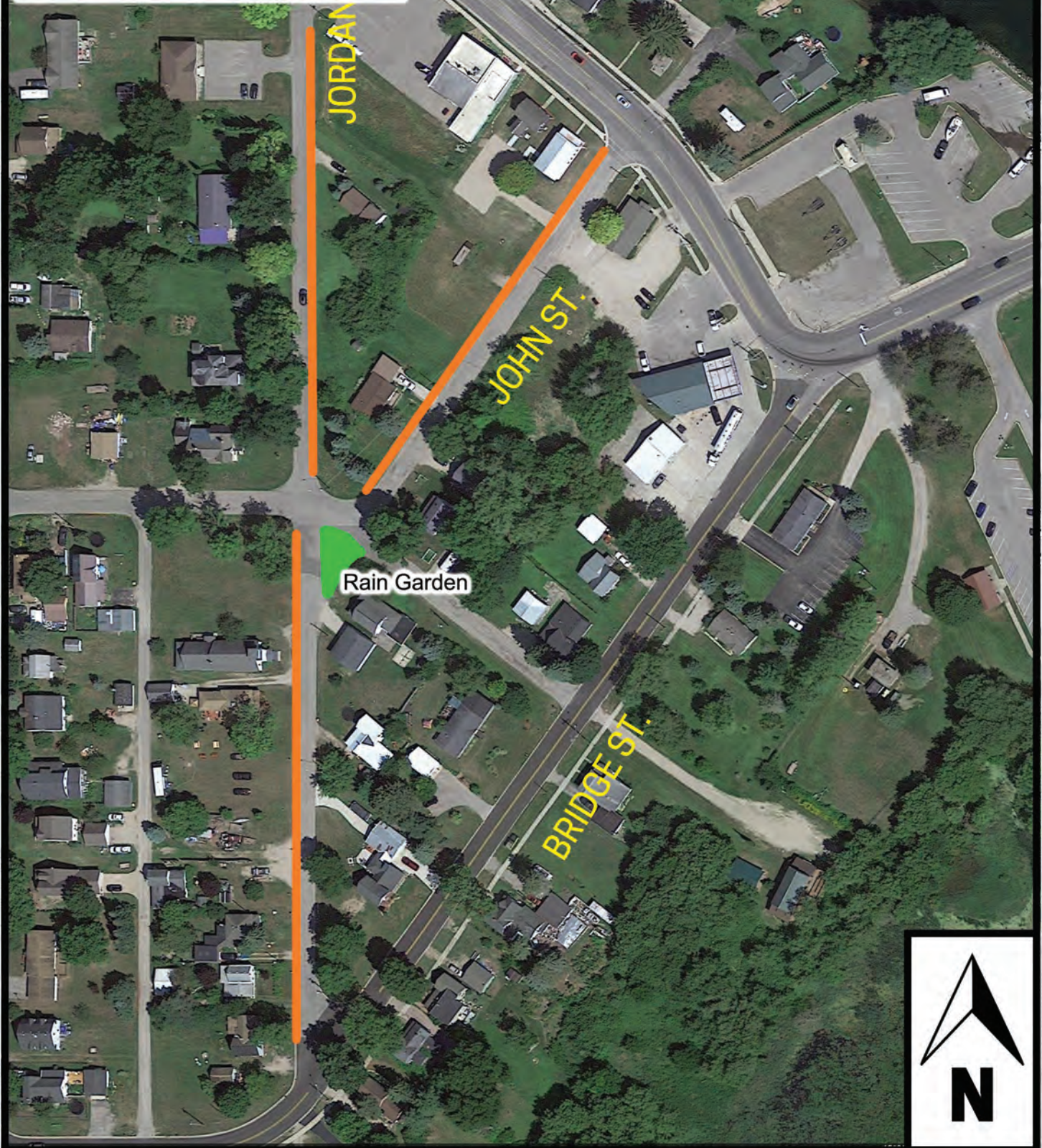


Bioretention Proposed



Green Street Proposed

Multiple scenarios will be shown including bioretention and permeable pavers



# EAST JORDAN 7 - ECHO & DICKENS STREET

## Legend

-  Bioretention Proposed
-  Existing Catch Basin



## Appendix B – Meeting Minutes (Project Initiation and Site Visits)

### City Responses to Site Visit Notes – July 8, 2020

At the interim meeting on July 8, 2020 the questions generated during site evaluations were answered. The questions are copied from the site visit notes and their responses listed below each question. Context for these answers are listed in the previous section.

1. a. Are the Schools Aware of our green infrastructure visioning? Can we get documentation of the building and storm sewer drainage for the school?  
The school will be notified of the project and if documentation is available it will be shared.
- f. How used is this corner of the north parking lot behind the school? Treatment could be in the woods on the ravine or start in the corner of the parking lot.  
No answer received – visioning for this practice did not continue.
2. a. These planter boxes are very structured – Is there interest in removing them or just replanting?  
There has been discussions about future removal of the raised stone planter boxes as part of streetscape updates in the downtown.
- b. Could any space in the park on the corner of Williams Street and Main Street be used for stormwater treatment with bioretention/rain gardens? This location was not previously discussed.  
This site is a memorial park, so any visions should be kept in the road right-of-way.
- d. How in demand are parking spaces in the downtown?  
Parking spots are often in high demand. For pedestrian safety and infrastructure improvements a minimal amount of spaces could be considered for removal.
4. a. Is there any documentation for the nearby outfall?  
There is not official documentation for the pipe network that contributes to this outfall.

## Appendix C – Survey Results

Residents of East Jordan were invited to participate in a Green Stormwater Infrastructure (GSI) visioning process. The survey was available online from October 15 to December 4, 2020. Participants viewed a brief description, photo, and artistic renderings of the design as it would appear in that location. After scrolling through green infrastructure locations, participants completed a survey designed to gather community input regarding green stormwater infrastructure and the potential designs.

Seventy-four (74) people participated in the East Jordan GSI survey and the date of survey participation is shown in Figure C-1.

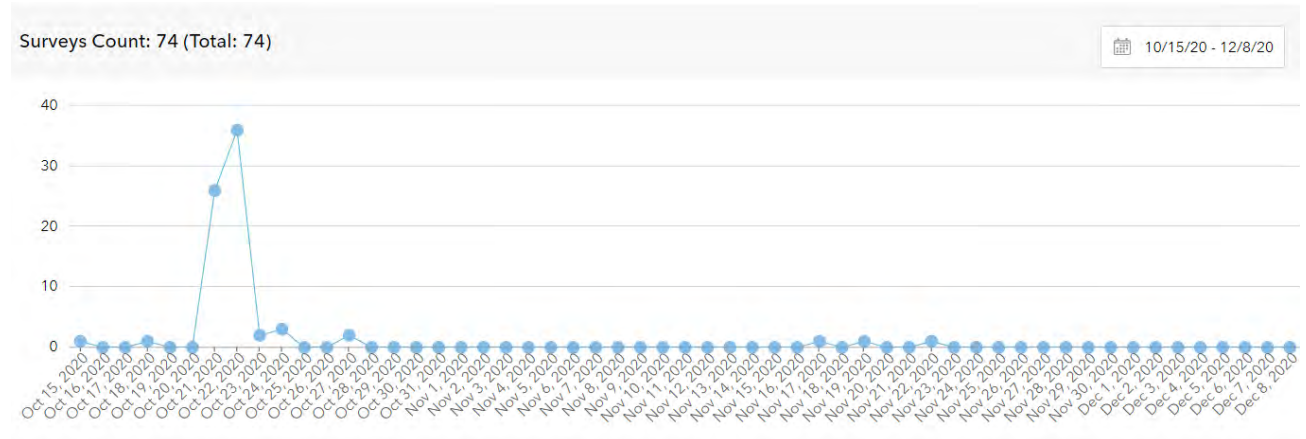


Figure C - 1: Survey Participation by Date



### Question 1: What best describes your connection to East Jordan?

The first survey question helped determine how participants were connected to East Jordan. The question was a drop-down list including the responses:

- I live or work in East Jordan.
- I live in a nearby community and visit.
- I vacation in East Jordan.
- Other – Fill in a text response.

Results are shown in Figure C-2. The one respondent who selected “Other” as an answer wrote: “I live 2 miles out, but used to live in town.”.

Answers	Count	Percentage
I live or work in East Jordan.	59	79.73%
I live in a nearby community and visit.	10	13.51%
I vacation in East Jordan.	3	4.05%
I am not a resident or visitor.	0	0%
Other	1	1.35%

**Figure C - 2: Survey Responses to Question 1**

### Questions 2 through 9: Rate the GSI Concepts

Survey respondents were asked to “Please rate the GSI concepts to help us understand public preferences” for the eight concepts (Figure C-3) proposed for East Jordan. The survey included Figure C-3 embedded and followed by the questions where respondents were asked to indicate the answer that best expressed their opinion of each proposed practice:

- I love it!
- I like it.
- I like the concept, but dislike the location.
- I dislike the appearance, but not the concept.
- I do not like anything about this concept.

Responses for each concept are shared in Figures C-4 to C-11.



*Figure C - 3: Figure from Survey for Questions 2 through 9*

Question 2: Practice 1 – Downtown Bioretention Crosswalk

Respondent instructions for this question were, "Please rate the GSI concepts to help us understand public preferences". Responses are shown in Figure C-4.

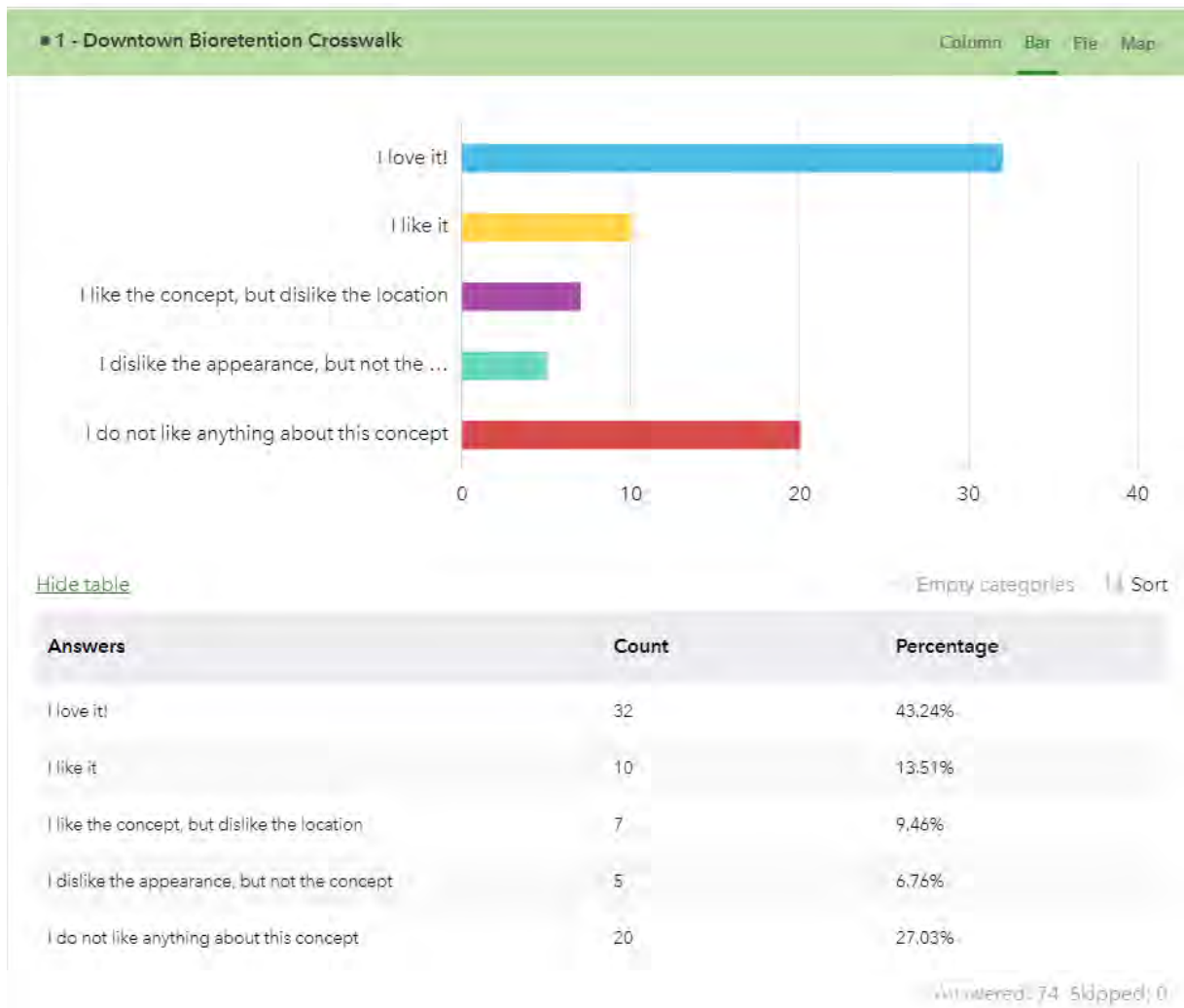


Figure C - 4: Survey Responses to Question 2

Question 3: Practice 2 – Downtown Stormwater Tree Boxes

Respondent instructions for this question were, "Please rate the GSI concepts to help us understand public preferences". Responses are shown in Figure C-5.

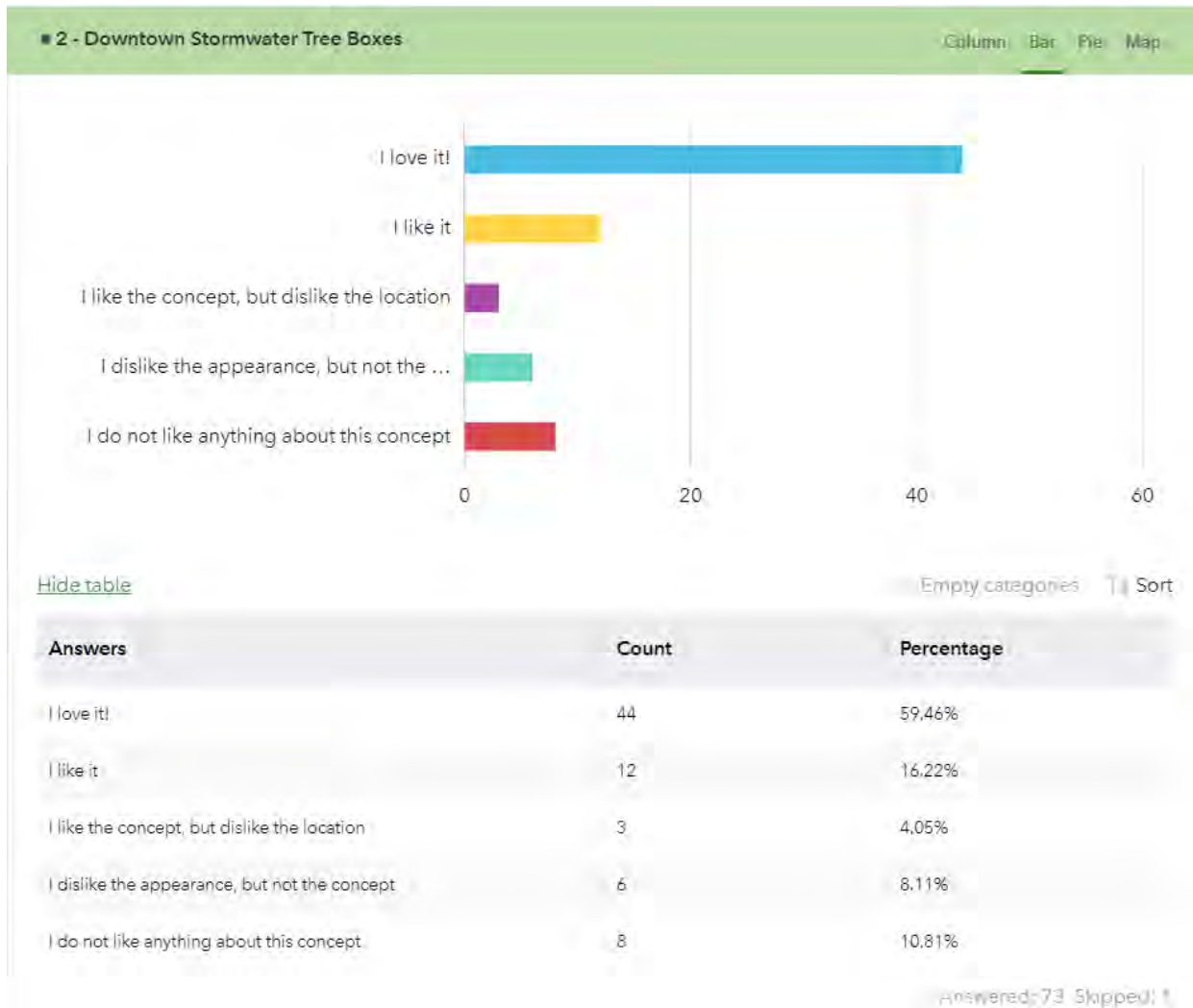


Figure C - 5: Survey Responses to Question 3

Question 4: Practice 3 – Downtown Bioretention

Respondent instructions for this question were, "Please rate the GSI concepts to help us understand public preferences". Responses are shown in Figure C-6.

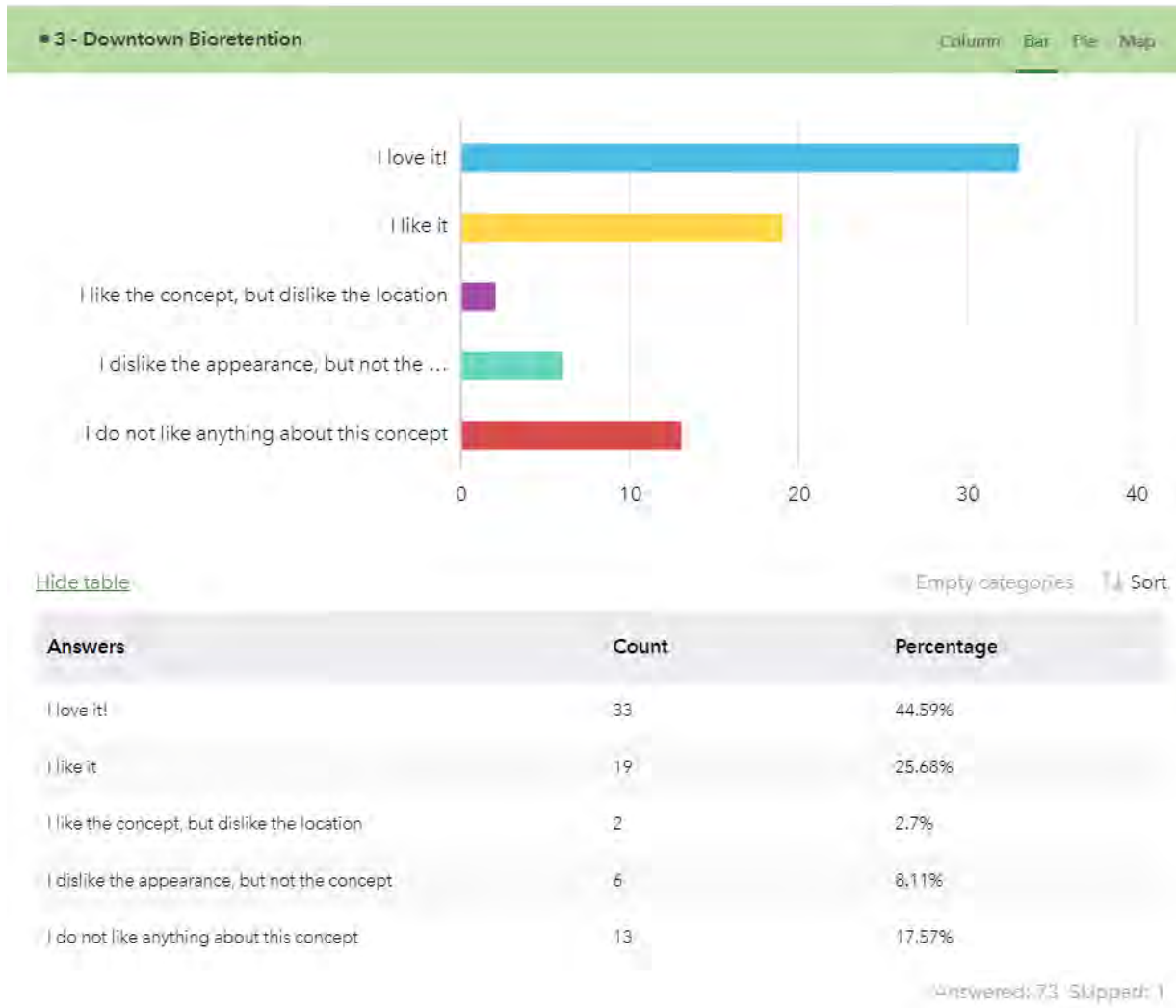


Figure C - 6: Survey Responses to Question 4

Question 5: Practice 4 – Echo Street Bioretention and Parking

Respondent instructions for this question were, "Please rate the GSI concepts to help us understand public preferences". Responses are shown in Figure C-7.

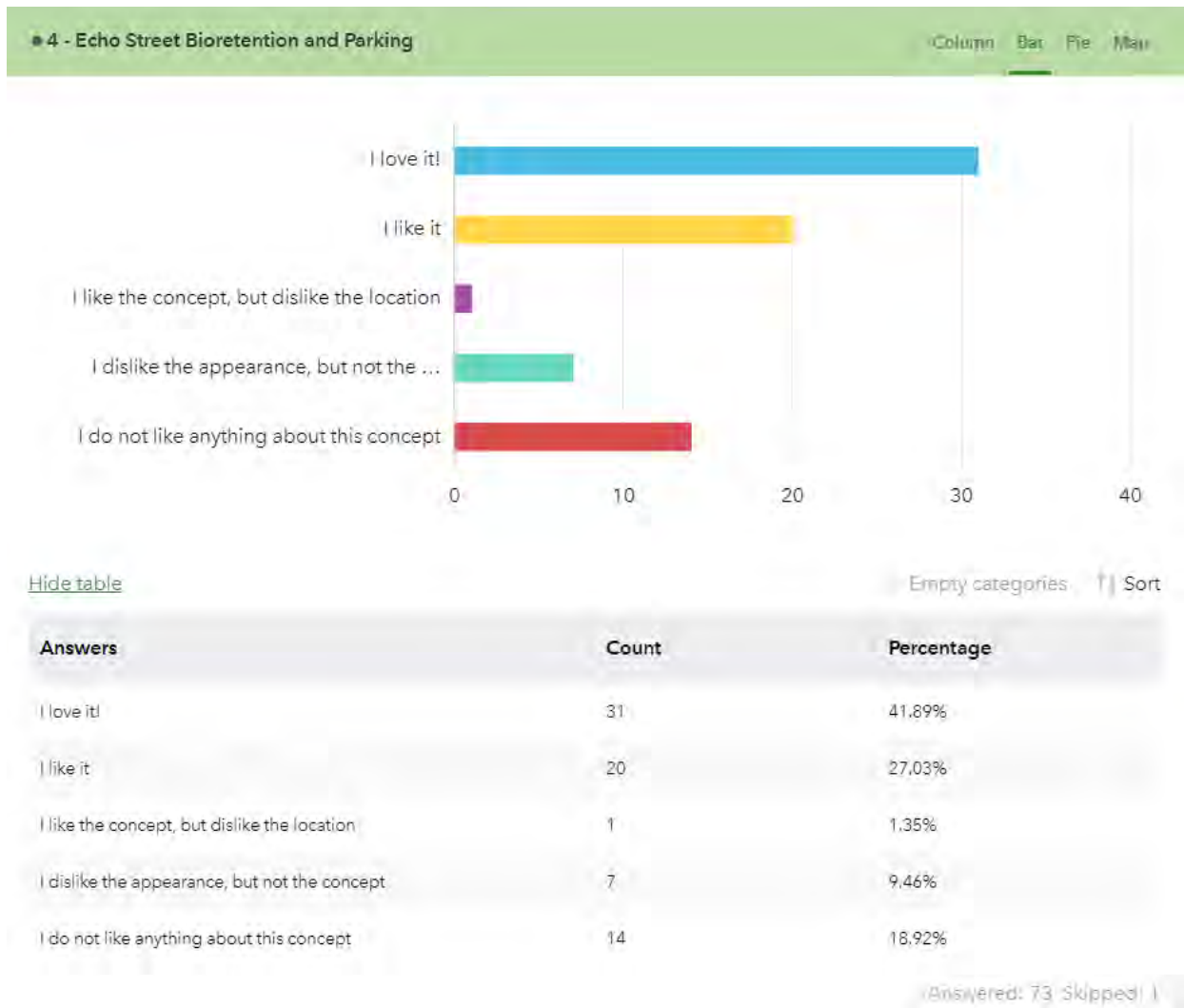


Figure C - 7: Survey Responses to Question 5

Question 6: Practice 5 – John and Jordan Intersection

Respondent instructions for this question were, "Please rate the GSI concepts to help us understand public preferences". Responses are shown in Figure C-8.

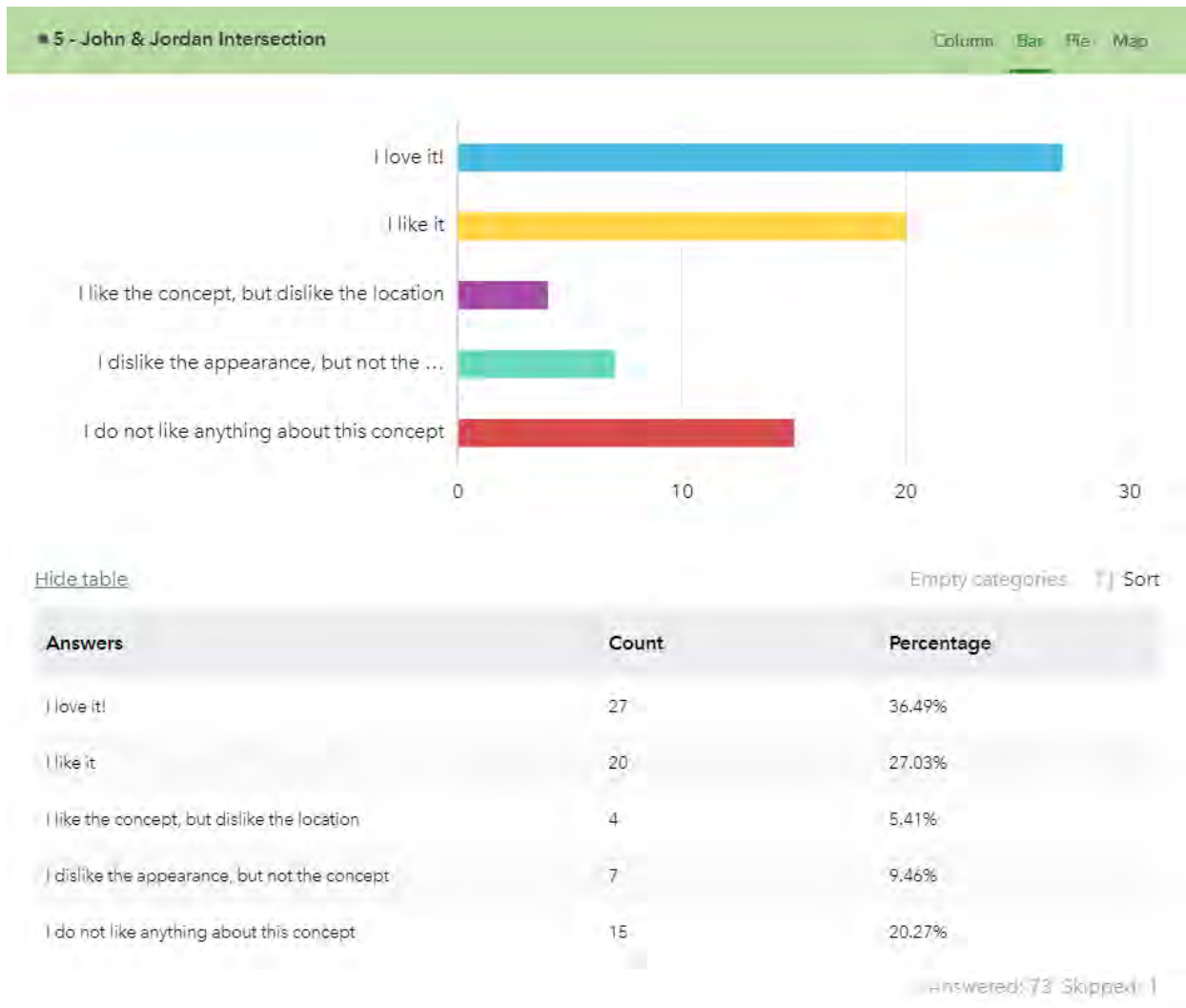


Figure C - 8: Survey Responses to Question 6

Question 7: Practice 6 – John and Jordan Street Upgrades

Respondent instructions for this question were, "Please rate the GSI concepts to help us understand public preferences". Responses are shown in Figure C-9.

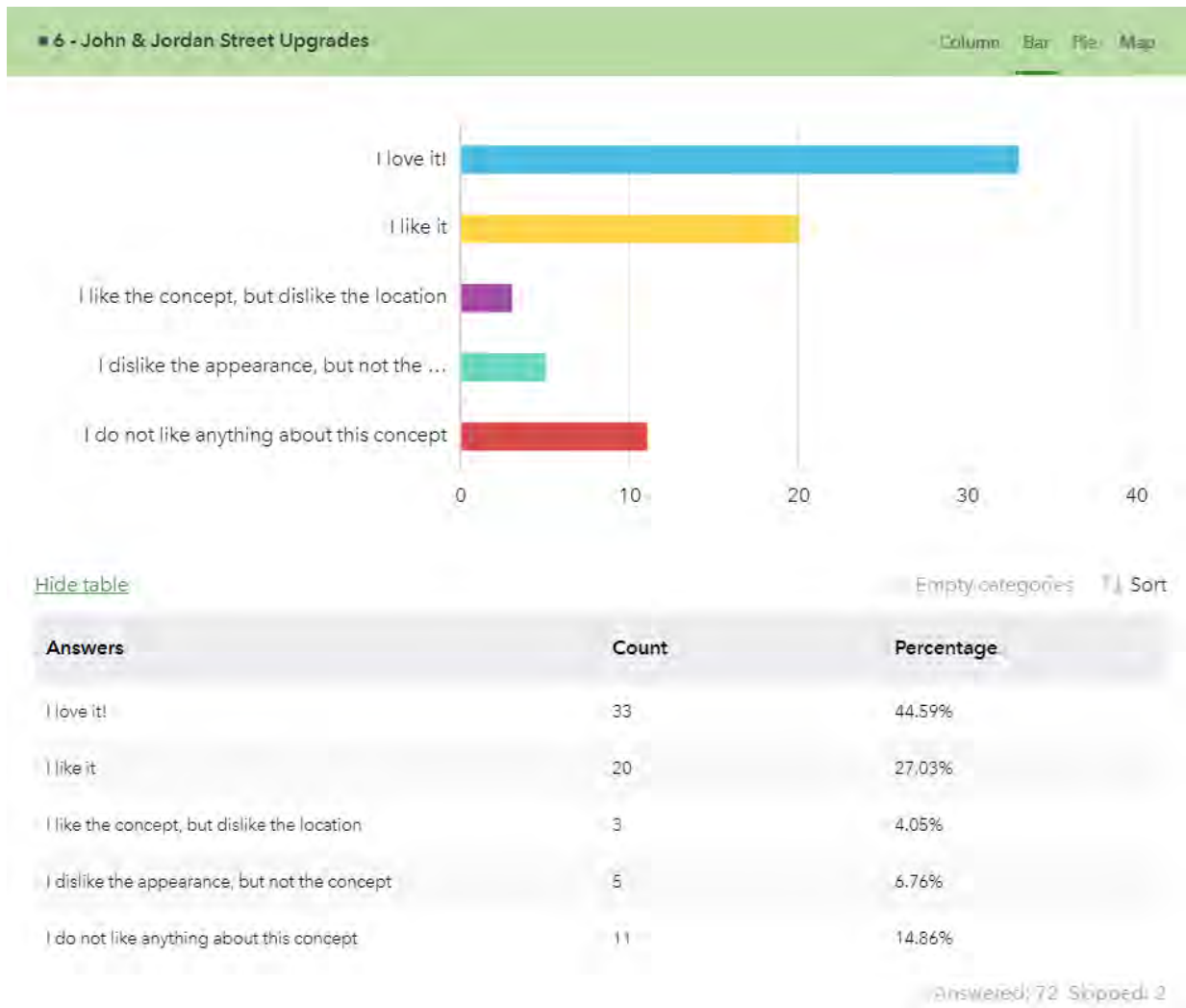


Figure C - 9: Survey Responses to Question 7



Question 8: Practice 7 – East Jordan Schools Rain Garden

Respondent instructions for this question were, "Please rate the GSI concepts to help us understand public preferences". Responses are shown in Figure C-10.

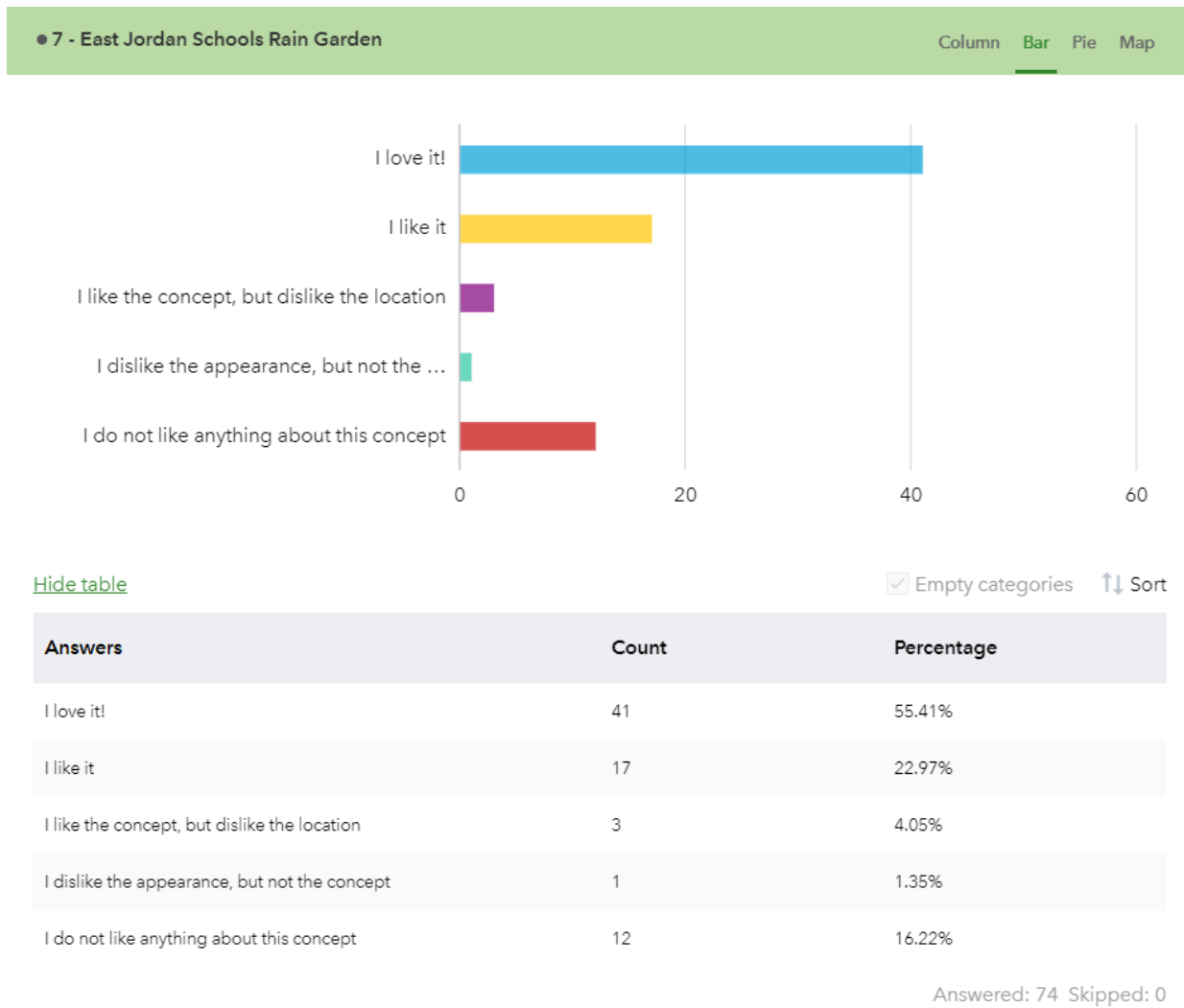


Figure C - 10: Survey Responses to Question 8

Question 9: Practice 8 – East Jordan School Maple Street Entrance

Respondent instructions for this question were, "Please rate the GSI concepts to help us understand public preferences". Responses are shown in Figure C-11.

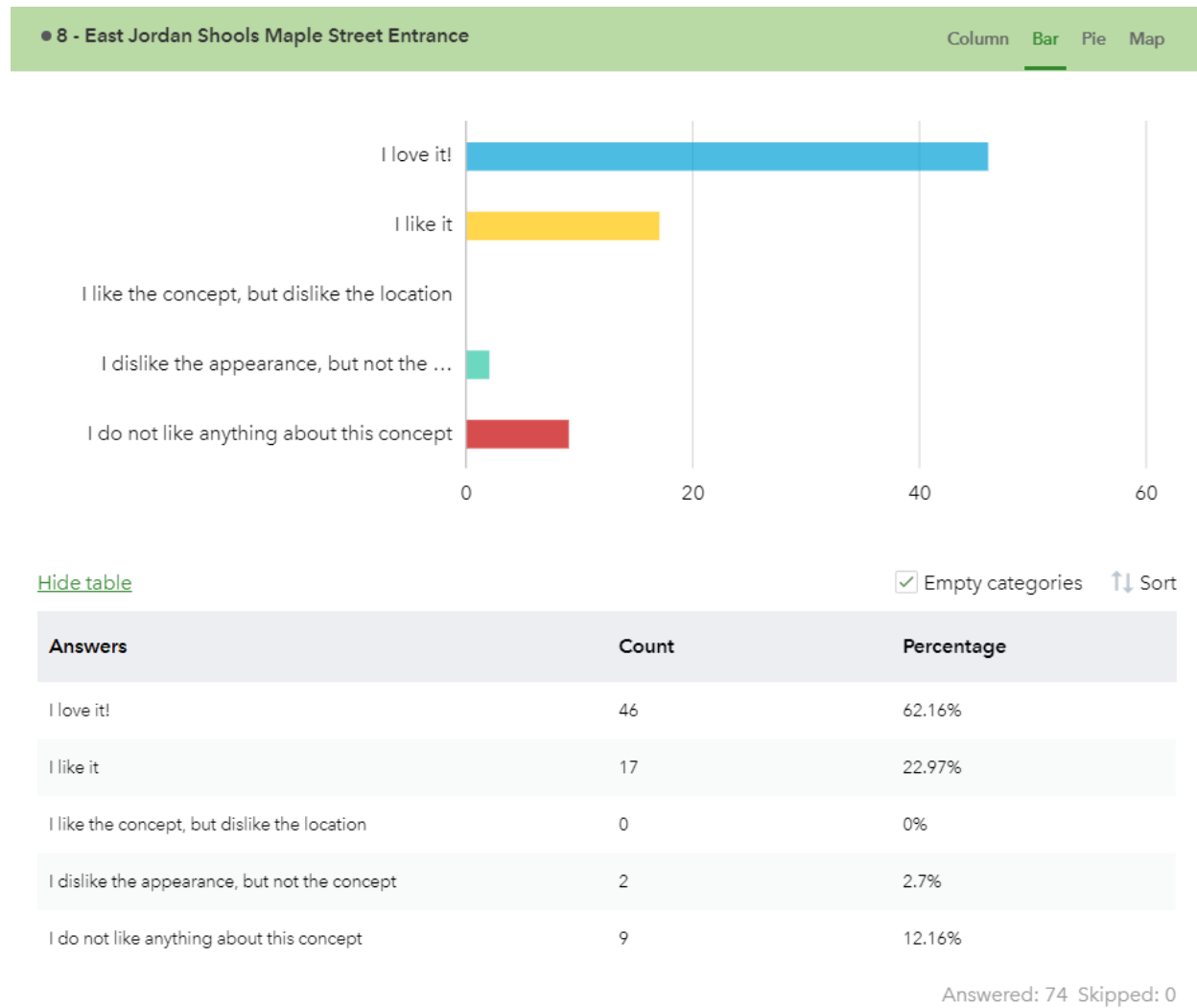
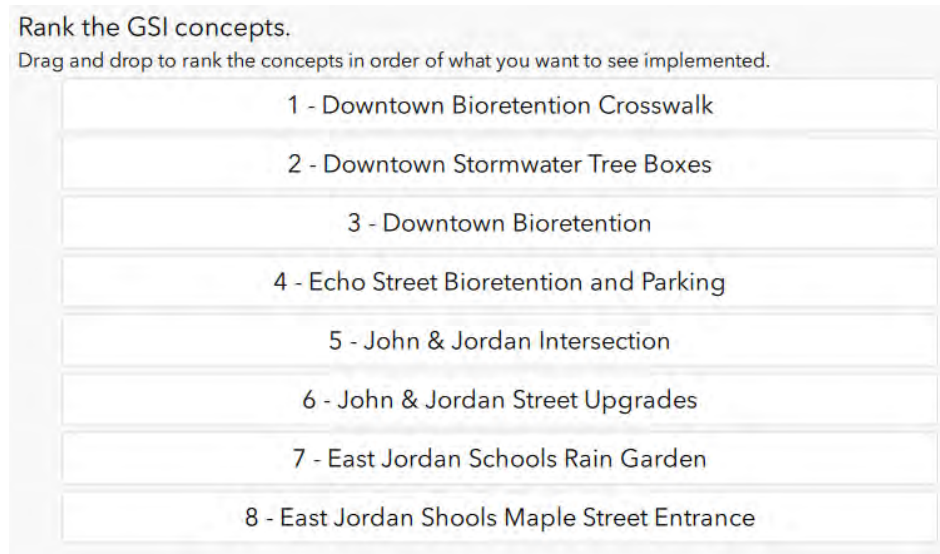


Figure C - 11: Survey Responses to Question 9

#### Question 10: Drag and Drop Ranked Choice

Respondents were asked to “drag and drop rank the concepts in order of what you want to see implemented”. Figure C-12 shows a screenshot of the survey for question 10. The question may have appeared different depending on what device was used to access the survey.



Rank the GSI concepts.  
Drag and drop to rank the concepts in order of what you want to see implemented.

1 - Downtown Bioretention Crosswalk
2 - Downtown Stormwater Tree Boxes
3 - Downtown Bioretention
4 - Echo Street Bioretention and Parking
5 - John & Jordan Intersection
6 - John & Jordan Street Upgrades
7 - East Jordan Schools Rain Garden
8 - East Jordan Shools Maple Street Entrance

**Figure C - 12: Screenshot of Survey Question 10**

Due to a user difficulty with the phone-based version of the survey, many users did not answer the question and the resulting order was submitted as “1,2,3,4,5,6,7,8”. Due to the known user difficulty, any results that did not modify rank order in the survey were removed before evaluating the data. The ranked choice voting results were weighted based on the number of votes for 1st place, 2nd place, 3rd place, etc. and the resulting ranked order is:

- 2 - Downtown Stormwater Tree Boxes
- 1 - Downtown Bioretention Crosswalk
- 3 - Downtown Bioretention
- 4 - Echo Street Bioretention and Parking
- 8 - East Jordan Schools Maple Street Entrance
- 7 - East Jordan Schools Rain Garden
- 6 - John & Jordan St. Upgrades
- 5 - John & Jordan Intersection

The number of times each practice received a 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, etc rank is listed in the Table C-1:

**Table C-1 – Number of Results for Each Practice Ranking**

GSI CONCEPT	RANK							
	<i>First</i>	<i>Second</i>	<i>Third</i>	<i>Fourth</i>	<i>Fifth</i>	<i>Sixth</i>	<i>Seventh</i>	<i>Eighth</i>
1 - Downtown Bioretention Crosswalk	18	8	8	4	4	4	2	9
2 - Downtown Stormwater Tree Boxes	24	17	3	5	1	3	3	1
3 - Downtown Bioretention	2	7	19	6	11	6	5	1
4 - Echo Street Bioretention and Parking	0	7	4	15	10	12	6	3
5 - John & Jordan Intersection	3	3	5	2	12	9	16	7
6 - John & Jordan St. Upgrades	2	6	5	7	4	12	8	13
7 - East Jordan Schools Rain Garden	6	2	5	8	6	8	9	13
8 - East Jordan Schools Maple Street Entrance	2	7	8	10	9	3	8	10

Question 11: Concept 6 - Aesthetics

Respondents were asked “Which of these proposed versions do you aesthetically prefer?” for Concept 6 (Figure C-13). Figure C-13 was embedded in the survey and shows the practice rendered with four different street alternatives. Version 6A was the preferred choice from the survey results with 27 of 74 votes cast (Figure C-14). The other three options were similar in popularity with 14 votes (6b), 15 votes (6C), and 13 votes (6D).



Figure C - 13: Survey Image for Question 11

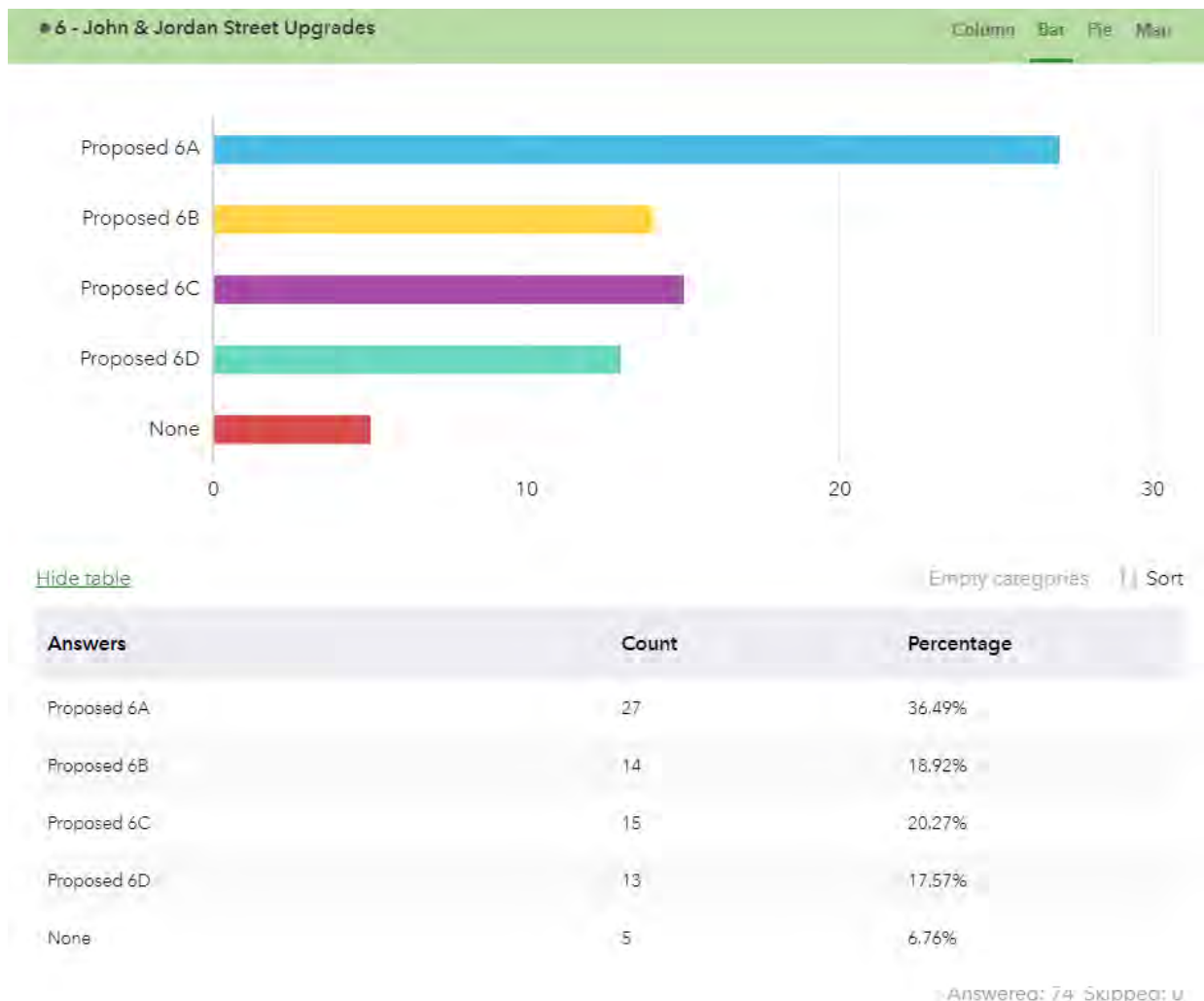


Figure C - 14: Survey Responses to Question 11

### Question 12: Concept 6 - Text

Respondents were then asked, "Why did you select that version of Concept 6 as your preference?". Forty-seven respondents did not answer this question. Responses are recorded verbatim below grouped by which version of the practice they chose.

Text responses for "None":

- Why are spending this money on this. I have a better idea - fix the streets that have pot holes in them. Fix the water runoff issue from Hillcrest.
- It's a beautiful idea, but right now our town needs other things. The gardens are nice, but unrealistic. This is not the year to "beautify" ej, and the lake is fine. Too many are struggling. This plan is insulting to all those struggling.
- Fix what is necessary and safe before making the silly beautifying changes.
- Cleaning up the water is important, but it should start with getting rid of what is polluting it, not building rainwater purification systems that cost us more money. This is a small town with ridiculous taxes already! Don't make it harder to live here!
- Who will maintain these?

Text responses for Proposed 6A:

- Well the flower boxes were just put in not that long ago, so why was this not discussed then???? The cost an time people put in to make it pretty downtown an now people want to RIP it out to something else....
- Thank you for doing this
- I live the work that is going into the project and that the city is trying to improve the visual aesthetic of our town. Thank you for your hard work!
- Garfield st sidewalks flood which also floods the lawns around the sidewalk. Kids in this neighborhood walk to school because they arnt allowed to ride the busses. They need to be fixed.
- I worry about utilizing any of these concepts that require up-keep. The city has many areas that are currently neglected and can't see where they could keep these new concepts from looking neglected.
- 5-10 yr aesthetic look on vegetated rain garden will look terrible. Maintenance issues, unrealistic for our budget and community needs. Local examples of these sites for public present? Consider plowing with these "GSI bump outs"/broken curbs/spring mess
- Don't waste our money

Text responses for Proposed 6B:

- Cost too much to maintain
- Thank you for all your hard work and concern for the environment!
- I really appreciate this survey! I hope it goes to good use.
- We are so happy that these steps are being taken! Lake Charlevoix is a treasured glacial lake that was abused into the 20th century. We must work to keep its' waters pure & safe for recreating & fishing

Text responses for Proposed 6C:

- I'm very happy to see these improvements to our town. Long overdue and visibly pleasing.
- We've had a problem with wastewater run off every time it storms it seems like so these are great ideas. The main street upgrades are athletically pleasing and make sense.
- I hate to see existing raised beds on Main go. They provide a nice shady spot to sit. love proposed 1 and 3. I do agree that we already have a parking issue. People will just have to get use to walking a little bit THERE ARE places to park.
- I'm so proud and excited that the city is taking action into this topic! Thank you for beautifying AND cleaning our beautiful home!
- "I am concerned if infrastructures were not kept up or would definitely to look good. I would rather it not have plants if it will be a problem with maintaining.
- Great ideas though!!"

Text responses for Proposed 6D:

- Make upgrades winter plowing friendly, Petoskey especially Mitchell street is a nightmare in the winter time. Especially when I drove Schwab's truck. Yes it looks nice in summer but isn't great for the locals in winter.
- No
- How is this going to benefit the residents of East Jordan?? This is only being to make more attractive to tourists. Just like that debacle down at the bridge! When is that going to be done??
- The people who come up with these concepts have never sat behind the wheel of a plow, and plowed snow.
- There is no downtown parking.
- Please re-evaluate this project, it is a great cost to our community with little reward. We are not as concerned with these little upgrades as we are with our road quality, sidewalk quality, removal of EJ foundry, and other much needed projects. Thanks

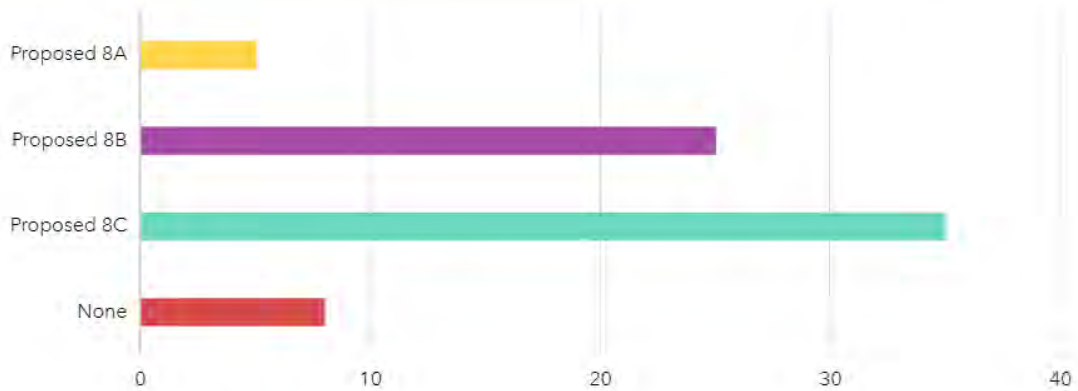
Question 13: Concept 8 - Aesthetics

Respondents were asked “Which of these proposed versions do you aesthetically prefer?” for Concept 8 (Figure C-15). Figure C-15 was embedded in the survey and shows the practice rendered with three different plant pallets. Majority of responses (35) were in favor of version 8C, with version 8B as the next most popular version with 25 votes of 73 (Figure C-16). One respondent did not answer this question.



*Figure C - 15: Survey Image for Question 13*





[Hide table](#)

Empty categories: 1 Sort

Answers	Count	Percentage
Proposed 8A	5	6.76%
Proposed 8B	25	33.78%
Proposed 8C	35	47.3%
None	8	10.81%

Answers: 73 Skipped: 1

**Figure C - 16: Survey Responses to Question 13**

#### Question 14: Concept 8 - Text

Respondents were then asked, "Why did you select that version of Concept 8 as your preference?". Twenty-three respondents did not answer this question. Responses are recorded verbatim below grouped by which version of the practice they chose.

Text responses for "None" responses:

- Why are spending this money on this. I have a better idea - fix the streets that have pot holes in them. Fix the water runoff issue from Hillcrest.
- No. The new parking lot needs lights instead
- Same a prior answer.
- I just don't have a preference here. I think all are fine
- I think 8A will look unkept and collect litter.
- 8B will easily become overgrown and it's unnecessary
- 8C will eventually grow to make it difficult to see people coming around the corner or crossing the street
- Although plain, I don't mind how it is now.

Text responses for Proposed 8A:

- It's unique.
- It looks nice but does not block vision as much as the taller grass. I think the trees just look a bit too scattered.
- We have plenty of trees surrounding campus. Flowers will be beautiful as long as they are maintained.
- Because a planted marsh will collect more water than grass or small landscaped area
- This would be a pollinator garden also.

Text responses for Proposed 8B:

- Looks a little more neat than the open field option, but still serves the intended purpose. The trees seem a little more randomly planted than a garden.
- It fills out the area more.
- Visually pleasing, think the trees would eventually obstruct view
- It looks warm an inviting but who is gonna be responsible for the upkeep on the garden.?
- Looks well-kept but isn't trees
- I think the flowers and grass will add to helping wildlife such as bees flourish. Realistically, it will also be the best option when it comes to plowing in the winter. Trees will grow and block the view of the school and parking lot.
- Like the color and tall grass
- Looks better than just the natural meadow, but good for rainwater.
- Nicer for the eyes
- The aesthetics of this design add to the entrance and landscape of our school...very inviting.
- I think with the flower border it doesn't look as unkempt as the full prairie look. This option I chose was tie close with the tree one.

- I like the organized garden idea. I am considering the student drivers and thinking the trees may be a visual block for them.
- There's so many trees around the school and not enough flowers.
- Looks lower maintenance but still pretty
- Easier to maintain.
- 8B looks like mostly easy maintenance but with enough thought that it won't look neglected.
- Most natural and least maintenance.

Text responses for Proposed 8C:

- Planting trees and the rainwater concept is great for our students. It's also not tearing up existing structure that will likely raise our already outrageous taxes and create another thing that needs a crazy amount of maintenance!
- Trees help clean the air, provide shade for the sport spectators in that area of the school.
- Looks crisp
- Makes more shade and you could add picnic tables for the softball games.
- Wind breaker for winter months, it looks nice but also doesn't have as much upkeep as the planted flowers. Wild flowers in 8A can become overgrown and ugly as the season comes and goes. 8C will look nice all year round
- I think the trees look nicer and you can see cars and children walking easier than tall grass/brush.
- Things by the sign could make it hard to see if not maintained
- Less up keep needed for trees.
- Who will take care of unsightly weeds in the future.
- Trees are better for the area than flowers.
- Cool
- 5-10 year aesthetic looks on vegetated rain gardens will look terrible. Maintenance on these rain gardens are unrealistic for our budget and community needs.
- Easier maintenance. I also love 8B as a close 2nd.
- Looks the best out of all
- Will look more well maintained compared.
- Anywhere we can plant more trees is a plus. Also looks neat and easy to mow/maintain.
- The trees are more noticeable and more trees need to be planted
- Trees are longer lasting. More bang for the buck. Less maintenance and give shade, oxygen and fall beauty
- I like 8B also a lot! but thought the trees would be better for shade if you thought people would be hanging out in that area.
- Traffic is crazy up there. If there were bushes I would think students would accidentally walk on them to be safe from drivers
- Looks pleasing to the eye
- Eventually could be nice area for outside classes under the trees.

- Trees good no maintenance
- We need more trees.
- Trees take care of themselves, flowers don't.

Questions 15-16: Additional GSI Questions

*Question 15: Do you want to see more Green Stormwater Infrastructure (GSI) in East Jordan?*

Majority of responses people who responded selected Agree or Strongly Agree (50 of 73). Fourteen of the 73 responses selected disagree or strongly disagree (Figure C-17).



**Figure C - 17: Survey Responses to Question 15**

Question 16: Do you feel Green Stormwater Infrastructure (GSI) is important to improving water quality in Lake Charlevoix?

Many of the respondents agreed or strongly agreed that GSI is important to improving water quality in Lake Charlevoix (54 of 73 surveyed). Figure C-18 shows the results for survey question 16.

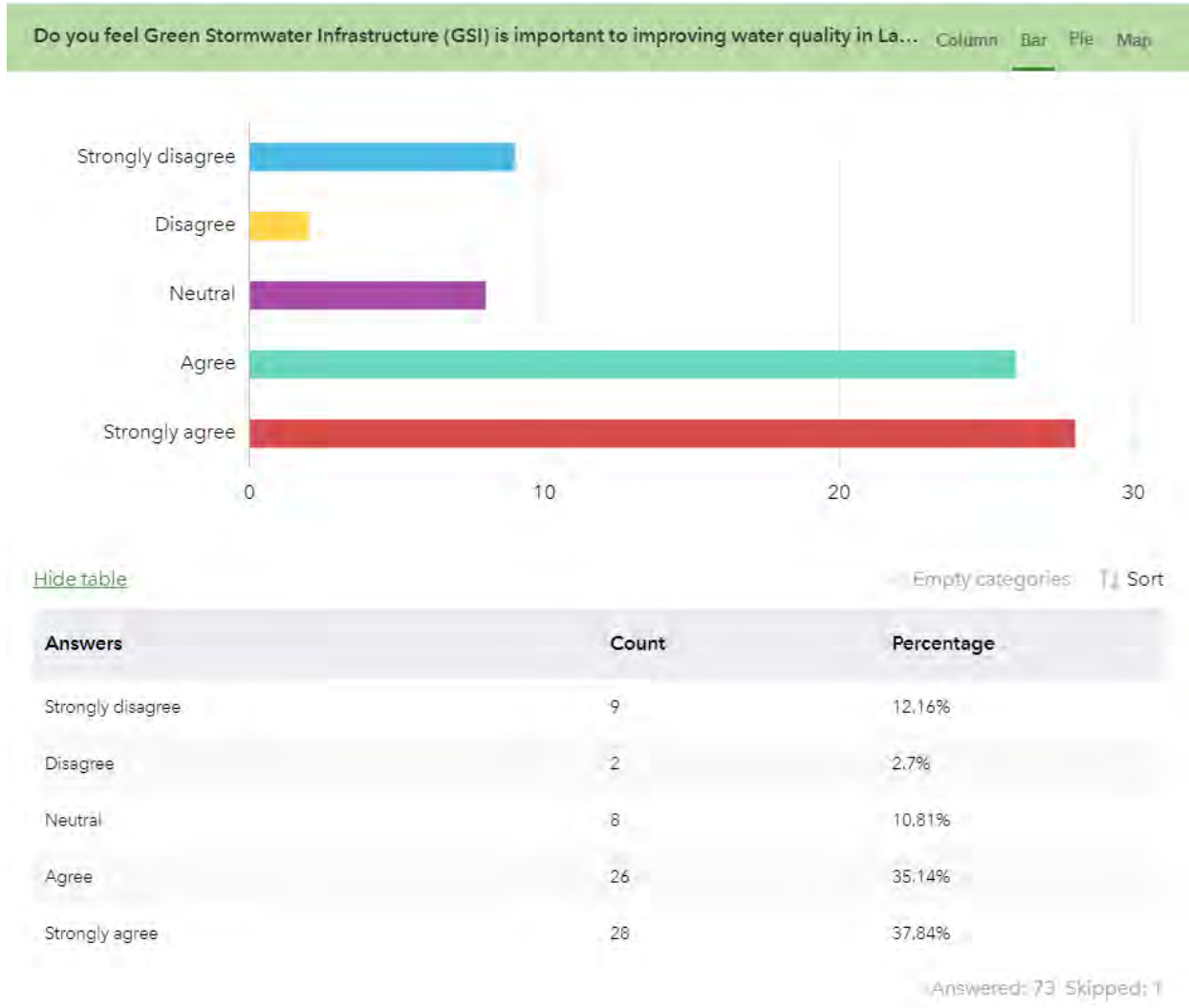


Figure C - 18: Survey Responses to Question 16

*Question 17: Do you have any additional comments you would like to share with us?*

Twenty-seven participants provided the below answers. Answers are provided verbatim.

1. Why are spending this money on this. I have a better idea - fix the streets that have pot holes in them. Fix the water runoff issue from Hillcrest.
2. Who will maintain these?
3. We've had a problem with wastewater run off every time it storms it seems like so these are great ideas. The main street upgrades are athletically pleasing and make sense.
4. Well the flower boxes were just put in not that long ago, so why was this not discussed then???? The cost an time people put in to make it pretty downtown an now people want to RIP it out to something else....
5. We are so happy that these steps are being taken! Lake Charlevoix is a treasured glacial lake that was abused into the 20th century. We must work to keep its' waters pure & safe for recreating & fishing
6. There is no downtown parking.
7. The people who come up with these concepts have never sat behind the wheel of a plow, and plowed snow.
8. Thank you for doing this
9. Thank you for all your hard work and concern for the environment!
10. Please re-evaluate this project, it is a great cost to our community with little reward. We are not as concerned with these little upgrades as we are with our road quality, side walk quality, removal of EJ foundry, and other much needed projects. Thanks
11. No
12. Make upgrades winter plowing friendly, Petoskey especially Mitchell street is a nightmare in the winter time. Especially when I drove Schwab's truck. Yes it looks nice in summer but isn't great for the locals in winter.
13. It's a beautiful idea, but right now our town needs other things. The gardens are nice, but unrealistic. This is not the year to "beautify" ej, and the lake is fine. Too many are struggling. This plan is insulting to all those struggling.
14. I'm very happy to see these improvements to our town. Long overdue and visibly pleasing.
15. I'm so proud and excited that the city is taking action into this topic! Thank you for beautifying AND cleaning our beautiful home!
16. I worry about utilizing any of these concepts that require up-keep. The city has many areas that are currently neglected and can't see where they could keep these new concepts from looking neglected.
17. I really appreciate this survey! I hope it goes to good use.
18. I live the work that is going into the project and that the city is trying to improve the visual aesthetic of our town. Thank you for your hard work!
19. I hate to see existing raised beds on Main go.They provide a nice shady spot to sit.love proposed 1 and 3. I do agree that we already have a parking issue. People will just have to get use to walking a little bit THERE ARE places to park.
20. I am concerned if infrastructures were not kept up or would definitely to look good. I would rather it not have plants if it will be a problem with maintaining. Great ideas though!!
21. How is this going to benefit the residents of East Jordan?? This is only being to make more attractive to tourists. Just like that debacle down at the bridge! When is that going to be done??

22. Garfield st sidewalks flood which also floods the lawns around the sidewalk. Kids in this neighborhood walk to school because they arnt allowed to ride the busses. They need to be fixed.
23. Fix what is necessary and safe before making the silly beautifying changes.
24. Don't waste our money
25. Cost too much to maintain
26. Cleaning up the water is important, but it should start with getting rid of what is polluting it, not building rainwater purification systems that cost us more money. This is a small town with ridiculous taxes already! Don't make it harder to live here!
27. 5-10 yr aesthetic look on vegetated rain garden will look terrible. Maintenance issues, unrealistic for our budget and community needs. Local examples of these sites for public present? Consider plowing with these "GSI bump outs"/broken curbs/spring mess

Appendix D – Proposed GSI Practices



# EAST JORDAN GSI VISIONING | SITE 1

## 1 | Downtown Bioretention Crosswalk

Rain gardens, also known as bioretention basins, reduce the volume of and treat stormwater runoff using amended soils and native vegetation. They can be aesthetically pleasing and also provide valuable habitat for birds, butterflies and many beneficial insects. They also provide for traffic calming and increased visibility of pedestrian crosswalks thereby improving safety.



RUNOFF  
REDUCTION



COST ESTIMATE | \$ 14,400

# EAST JORDAN GSI VISIONING | SITE 2

## 2 | Downtown Stormwater Tree Boxes

Trees in raised planters only treat the rainfall that fall on them directly. Tree box filters help to effectively manage stormwater from the adjacent road by providing underground storage where water can collect, be filtered, and either naturally infiltrate into the ground, be absorbed by the tree, or slowly released to storm drains.



RUNOFF  
REDUCTION

100%

COST ESTIMATE | \$ 96,000

# EAST JORDAN GSI VISIONING | SITE 3

## 3 | Downtown Bioretention

Converting small sections of grass in the right of way to bioretention basins allow stormwater runoff from the adjacent road to be captured and cleaned before discharging into the lake.



RUNOFF  
REDUCTION

41%

COST ESTIMATE | \$ 6,200

# EAST JORDAN GSI VISIONING | SITE 4

## 4 | Downtown Bioretention Crosswalk

GSI practices can be combined, like this concept of porous paver parking and adjacent native plants. Porous or permeable pavement surfaces allow stormwater to infiltrate into underlying soils, thereby promoting pollutant treatment and groundwater recharge. Native plants provide additional treatment and beauty.

EXISTING



PROPOSED 4



DR. DICKENS DR.

ECHO ST.

RUNOFF  
REDUCTION

100%

COST ESTIMATE | \$ 89,200

# EAST JORDAN GSI VISIONING | SITE 5

## 5 | John and Jordan Intersection

Safety could be increased and stormwater managed by changing this large five-way intersection into two separate intersections and replacing paved area with bioretention to capture and treat stormwater runoff.

EXISTING



PROPOSED 5



JORDAN ST.

UNION ST.

RUNOFF  
REDUCTION

100%

COST ESTIMATE | \$ 41,900

# EAST JORDAN GSI VISIONING | SITE 6

## 6 | John and Jordan Street Upgrades

Currently, there is no stormwater infrastructure along most of John Street and Jordan Street. Future roadway upgrades should include stormwater conveyance and treatment. A few options include porous pavers in new street gutters (6A), curb and gutter trench drains with underground infiltration chambers (6B), bioswales with piped overflow (6C), or grass swale with piped overflow (6D).



**RUNOFF  
REDUCTION**

**100%**



# EAST JORDAN GSI VISIONING | SITE 7

## 7 | East Jordan Schools Rain Garden

Unutilized turf grass areas near roof downspouts are ideal locations for rain gardens. These are easy to incorporate into science curricula and promote environmental stewardship.

EXISTING



PROPOSED 7



RUNOFF  
REDUCTION

100%

COST ESTIMATE | \$ 10,100

# EAST JORDAN GSI VISIONING | SITE 8

## 8 | East Jordan Schools Maple Street Entrance

Native planting areas can have many different appearances including natural prairie plantings (8A), semi-formal planting (8B) or trees (8C). All of which treat stormwater better than turf grass.



EXISTING



PROPOSED 8A



PROPOSED 8B



PROPOSED 8C



RUNOFF  
REDUCTION

100%

COST ESTIMATE | \$ 154,800